

7 474 1-6152 P 72 19
(34)

UNIVERSITY OF TORONTO



REPORT OF THE DEAN
OF THE
FACULTY OF MEDICINE

Session 1963-1964

Printed at the University of Toronto Press
Toronto, Canada, 1965

THE DEAN OF THE FACULTY OF MEDICINE

In my last report, considerable emphasis was placed on the imminence of health insurance and its possible effects on medical education. Since that time the Province of Ontario has given first reading to Bill 163, an Act making insurance against the cost of a physician's services universally available but not compulsory. A Commission is currently studying this Bill after having held public hearings and is to bring in a report sometime in the autumn of 1964. The basic feature of the Bill is that the physician will be paid a fee for service. This principle has also been incorporated into the report of the Royal Commission on Health Services appointed by the federal government. In order to anticipate the effects of health insurance on the teaching unit, which has heretofore been maintained on the basis that no patient is charged a fee for medical service, the clinical staffs of all the teaching hospitals have been exploring ways and means of preserving the teaching unit while reserving the right to collect a fee for service. The ethical and legal principles involved have been discussed with the Ontario Medical Association and with the College of Physicians and Surgeons of Ontario. Definite progress is being made and the University staff will, I am sure, be fully prepared to meet the challenge of any health scheme that will be introduced in the not too distant future.

To the medical schools of Canada which have been operating on meagre budgets and inadequate facilities, the prospect of increased demands imposed by a plan for health care are almost too much to contemplate without greatly increased support. The success of any health service introduced by government will ultimately be dependent upon the medical schools and their ability to train and supply personnel and to maintain standards. It is for this reason that medical educators feel very strongly that a first step in planning for a health service must be the strengthening of the medical schools and of all those educational facilities concerned with training health personnel.

The evolution of medical science and education is gaining momentum, after progressing at a greater rate during the past twenty years than ever before in history. To keep up with and anticipate change has become a monumental task; but no less than this has been attempted by the Special Committee of the Board of Governors inquiring into the future development of the Faculty of Medicine. After holding meetings over a period of a year and visiting two other centres, the Committee has submitted its report. The recommendations emphasize the need to increase full-time staff in both basic science and clinical science, and to provide adequate space for research and teaching. These two deficiencies have been evident for a long time and have been the cause of general dissatisfaction within the Faculty. While the academic staff has been reassured by the report of the Special Committee, it is concerned with the time required to implement the recommendations. Medical research which is explosive in its advances today imparts a sense of urgency to those engaged in it. The University is, however, doing everything possible to find temporary accommodation, and to remodel laboratories to improve their efficiency, in order that medical research may not be hindered. To these problems are now added two others of major importance: the withdrawal of support by the National Institutes of Health of the United States, and the increasing pressure from abroad on academic staff to accept very attractive positions with first-rate research facilities.

The withdrawal of support by the National Institutes of Health is not surprising as it had occurred previously in 1950. At that time it was the Medical Research Council which was able to increase its budget to the point where all worthwhile projects were able to continue with Canadian support. Once again it will be up to the Medical Research Council to supply necessary funds and, it is hoped, to expand its budget at a greater rate than it has been able to up to the present. The medical schools of Canada have become increasingly dependent upon the Medical Research

Council, not only for the support of research projects, but also for the support of academic personnel. It would be preferable to have the support of all academic personnel, including those engaged principally in research, originate with the University, but it is probable that this will not come, and that we must continue to look to the Medical Research Council for ever increasing support of research in its broadest aspect, including the personnel engaged in it. The total amount of money in Canada devoted to medical research is, by present-day standards in the United States, Great Britain and Sweden, woefully inadequate.

I mentioned above that the academic staff is receiving offers of attractive positions from abroad, and that while these are expected from the United States, they are not expected from Western Europe. In the next few months, one of our senior professors is going to West Germany. Two others have attractive offers from West Germany and Great Britain. It is evident now that there will be increasing competition for medical scientists throughout the Western world. In Canada we are not in a very good position to compete at the present time, because our facilities and budgets are lagging behind. It is therefore imperative that the recommendations of the Special Committee be implemented by the Board of Governors as rapidly as possible.

In the recommendations of the above-mentioned Committee, of greater long-term significance is the decision to support centralization of basic medical science and related clinical research on the campus, and at the same time to support the creation of research facilities, both experimental and clinical, in each of the major teaching hospitals. Such a bipolar development is considered the only one possible for this Faculty of Medicine with its three major hospitals, one of the largest undergraduate schools in North America, and the most highly developed programme in Canada for the training of graduate and postgraduate students. With the Toronto General, Toronto Western and St. Michael's Hospitals each becoming a clinical teaching centre, and with parallel programmes being conducted in all three at the same time, it is felt that much of the disadvantage of size from which the Faculty now suffers will be overcome. In so far as the smaller teaching hospitals are concerned, they will continue to be needed and will be associated with the teaching programme in one of the three centres. The campus-based complex of basic science and joint research space is an attempt to meet the problem of interdisciplinary research which is considered to be the greatest development to which medical science can look forward. It is hoped that the continuing association of basic scientists and clinical scientists in a common research area on the campus will provide flexibility and encourage interdisciplinary research. This will create problems with the School of Graduate Studies, but here again it is hoped that submissions made during the past academic year to the Laskin Committee will result in a recognition that the limitations of the existing disciplines must be overcome, and that achievement in interdisciplinary research must be rewarded.

The location of the basic sciences and the clinical scientists engaged in basic research on the campus has broad implications for the future health of the Faculty of Medicine and the University as a whole. To courses in anatomy, biochemistry, pharmacology and physiology come students from the School of Graduate Studies, from Life Sciences in the Faculty of Arts and Science, from Dentistry, from Pharmacy, from Physical and Health Education, from Food Sciences, from the School of Hygiene and from Nursing. There is thus no question about the need for the medical sciences to be in a central location on the campus where they are accessible to other divisions of the University. Similarly, medical science is becoming increasingly involved with other non-medical divisions of the University, as indicated elsewhere in this report.

The Institute of Biomedical Electronics has completed its second year very successfully. Dean McLaughlin in his report has given a good account of the activities during the past year. On the first of January, 1964, Dr. Llewellyn-Thomas was appointed Associate Professor in the Department of Pharmacology and Special

Lecturer in the Department of Electrical Engineering. While Dr. Thomas will continue to assist with the undergraduate teaching programme in Pharmacology, by far the greater part of his time is being devoted to the activities of the Institute. It is anticipated that with the addition of Dr. Thomas to the Institute, graduate students qualified in Medicine will be attracted to the field. Up to this point, the stimulus and initiative in the research programme and the graduate students have all come from the Engineering side, although there has been much co-operation on the part of medical staff in the development of many projects. The Institute is not yet an equal partnership between Medicine and Applied Science, but it is anticipated that it will be so in due course.

In association with the Faculty of Law and the School of Social Work, a Centre of Criminology has been established under the direction of Professor Edwards of the Faculty of Law. At the present time the contribution of this Faculty is principally from the Department of Psychiatry and in particular from Professor Gray who is qualified both in Law and Medicine. A promising graduate programme has already been instituted.

The Faculty of Medicine is assisting in a third interdisciplinary venture, the Communications Centre under Professor McLuhan. Dr. Cappon has been cross-appointed to this Centre.

The Faculty continues to increase in size, an inevitable result of specialization and the advances in research that are taking place. It is becoming apparent that the organization of the Faculty, and of the departments, must be adapted to meet the changing pattern of medical education and medical care. The department head is no longer the sole arbiter in all matters relating to his discipline. He is today an overworked administrator, particularly in the large clinical departments, where the diversity of interest and function make his task exceedingly difficult. While some discussions of this problem have taken place during the past year, they will have to continue until a satisfactory solution is reached, or else the position of department head will no longer be attractive to outstanding individuals.

Jurisdiction over the Diploma in Public Health was transferred during the year to the Council of the School of Hygiene from the Faculty of Medicine. While this is logical because all instruction in the course leading to the Diploma is given in the School of Hygiene, the Council of the Faculty of Medicine regretted this decision, because of the long and close relationship with the Department of Public Health, until a few years ago a department of this Faculty. Continued association of the two Councils is however assured by cross-representation of members of one Council to the other.

The Curriculum Study conducted by Dr. Oille for the past three years has resulted in a major change in the premedical course, and will have far-reaching effects on the medical course itself over the next few years. The modification of the premedical course, to be instituted in September of 1964, brings it closer to the General Course in Science. There is, however, preservation of two courses in the humanities in each of the two years. In the medical course, the problems faced by the Committees concerned with the curriculum are integration of disciplines and changing emphasis. What is required at this time is not a new curriculum but a mechanism or means whereby the courses of study will be under continual scrutiny, with changes possible whenever they are deemed necessary. It is hoped that Dr. Oille's Curriculum Committee will find a way towards a satisfactory evolution of the courses of study and their interrelationship.

The problem of admission of students to the premedical course, to first year Medicine, and to the course in Biology and Medicine in the Faculty of Arts and Science is growing. The Committee on Admissions for the premedical course has endeavoured over the past few years to give increasing emphasis to the whole record of the student in high school and to the various achievement tests, but its selection procedures have been questioned. This is inevitable with the large numbers of well-qualified applicants and the limited number of places available. The opinion is grow-

ing in the Admissions Committee that Grade 13 standing should be de-emphasized in favour of the total high school record, and possibly an interview. In the past year the applications for admission to the first medical year from candidates holding degrees in Arts or Science have increased in number to the point where only one in six applicants could be accepted. With this group, selection, although difficult, is easier than it is with Grade 13 candidates. The students are more mature and there is available, not only their high school record, but also a complete record of their achievement in university. Whenever possible the prospective candidate is interviewed. Despite this the number of drop-outs and failures in this group of students at the end of the first medical year is still too high. It is still too soon to know what problems will be encountered with the students coming through the course in Biology and Medicine as the first class is only just completing second year. There is undoubtedly a need for the appointment of a Standing Committee to take responsibility for admissions at all levels, as the pattern of applications and admissions has changed considerably over the years. Originally, the vast majority of students entered the premedical course, and only 15 or 20 per cent were admitted with advanced standing into the first medical year. This has now changed, and approximately one-third of the class of the first medical year are being admitted with advanced standing. This again will change when the graduates of the new course in Biology and Medicine enter the second medical year.

Student counselling at present carried out by the Dean and by staff advisers to students is not really adequate. A committee appointed by the Faculty Council to look into faculty organization is studying this problem, along with the structure of the Faculty Council and its Standing Committees and will, it is anticipated, recommend the appointment of an Assistant or Associate Dean to be responsible for all student affairs, including admissions.

Research in the Faculty continues to flourish as evidenced by the growing list of publications and by the numbers of addresses presented by members of staff at meetings of learned societies in North America and abroad. The number of members of staff invited to be visiting professors is also increasing each year and the growing number of invitations to Western Europe as well as the United States is a good indication of the international reputation of this Faculty.

Staff

During the past year the following members of staff have retired: Dr. M. C. Watson from the Department of Obstetrics and Gynaecology, Dr. N. Silverthorne from the Department of Paediatrics, Dr. M. Kohan from the Department of Medicine, Dr. A. M. McLeod from the Department of Oto-Laryngology, Dr. Rupert Balfour from the Department of Anaesthesia, and Dr. A. L. Morgan from the Department of Ophthalmology. Dr. Ethel Morgan resigned from the Department of Pathology. All these individuals were devoted teachers of both undergraduate and graduate students and over the years their contribution has been an extremely valuable one. Dr. Kohan as Chief of Service in the New Mount Sinai Hospital had not been on the staff a very long time, but in the short period that he was a member of the Department of Medicine he made a major contribution in the organization and development of the teaching service at the New Mount Sinai Hospital.

During the past year Professor Jerzy Olszewski died suddenly. As Head of the Division of Neuropathology since 1960, Dr. Olszewski had worked extremely hard and with great success in developing and building up the research side of his division. Graduate students had been attracted from many centres and from as far away as Japan and Poland. His untimely death is a major loss to this Faculty. Dr. Hurst Brown, Emeritus Professor of Medicine and former Chief of Staff at the Toronto Western Hospital, also died during the course of the year. His contribution to the development of research at the Western Hospital is growing in stature with the passage of time. The death of Dr. H. G. Pritzker, an Assistant Professor in the Department of Pathology and Director of Laboratories at the New Mount Sinai

Hospital, has deprived the University of a devoted teacher and outstanding pathologist. Dr. Pritzker had been a member of the staff of the Department of Pathology for many years before the affiliation of the New Mount Sinai Hospital with the University. Dr. K. G. McKenzie, a pioneer in the field of neurosurgery, died during the year. A pupil of Harvey Cushing and formerly Associate Professor in Surgery, Dr. McKenzie established in the Toronto General Hospital the first neurosurgical service in Canada. This has developed into a major training and research centre, a tribute to Dr. McKenzie's outstanding abilities.

I regret to report that Dr. D. M. Whitelaw has resigned from the Department of Medicine and the Princess Margaret Hospital, where he was Physician-in-Chief, to return to Vancouver. Dr. Adsett of the Department of Psychiatry is leaving to take up a post in Kansas.

Dr. Shirley Fleming and Dr. T. Frederick Nicholson are continuing for another year at the University of Lagos. The Dean of the Medical School at the University of Lagos, Mr. H. O. Thomas, has again spoken in glowing terms of their contribution. The visit of Dr. R. A. Gordon, Professor of Anaesthesia, to Lagos in January was of major assistance to Dr. Fleming and Dr. Nicholson in clarifying the problems of a new medical school, and in finding ways and means through which this University can be of further assistance.

Honours

Dean Hamilton was guest speaker at la Société Médicale de Montréal and also addressed the undergraduate students of the Université de Montréal. Professor Ian Macdonald was appointed Associate Dean of the Faculty of Medicine. Professor R. A. Gordon was President of the Canadian Anaesthetists' Society and was made an Honorary Fellow of the Association of Surgeons of West Africa. Dr. Iain MacKay was appointed Assistant Director Medical Services, Central Command, Medical Advisory Staff, R.C.A.M.C., in the rank of Colonel. He also served as aide-de-camp to His Honour the Lieutenant-Governor of Ontario. Miss Maria Wishart was appointed Director Emeritus of the Department of Art as Applied to Medicine. Professor J. W. A. Duckworth was elected President of the Canadian Association of Anatomists and Professor J. S. Thompson became second Vice-President. Professor C. S. Hanes was invited to the Polish Academy of Sciences to lecture at Warsaw, Cracow, and Wroclaw, and to visit biochemical institutes and universities in Poland.

Professor K. J. R. Wightman was made Chairman of the Medical Advisory Board, Toronto General Hospital, and was appointed to the Editorial Board of the *Annals of Internal Medicine*. Dr. R. F. Farquharson delivered an address at the opening of the Training and Research Building, Allan Memorial Institute, McGill University. Dr. S. Dubiski was made a member of the American Society of Immunologists. Dr. C. Ezrin was invited to participate in the International Colloquium on the Cytology of the Adenohypophysis in Paris. Dr. J. M. Finlay was made a member of the American Gastroenterological Association. Dr. J. C. Laidlaw was a member of the National Board of Medical Examiners, U.S.A., and Associate Editor, *Canadian Journal of Physiology and Pharmacology*. Dr. W. J. McIlroy was made a Fellow of the Royal College of Physicians and Surgeons of Canada. Dr. J. F. Mustard spoke at the World Health Organization in Geneva and the Gordon Conference on Medicinal Chemistry. Dr. J. F. Paterson was elected President of the Ontario Thoracic Society. Dr. A. Preston was made a Fellow of the Royal College of Physicians and Surgeons. Dr. A. Rapoport lectured at the Hebrew University, Jerusalem. Dr. W. B. Spaulding was appointed to the Council of the Academy of Medicine, the Ontario Medical Association, and was made Chairman of the Central Programme Committee of the Ontario Medical Association. Dr. E. D. Wigle was an invited participant to the Ciba Foundation Symposium on Cardiomyopathie, London. Dr. J. G. Watt spoke at Queen's University. Dr. H. J. M. Barnett was elected President of the Canadian Audubon Society and was Canadian delegate and Vice-President of the Pan-American Neurological Congress in Peru. Dr. J. R.

Evans was Chairman of the Programme Committee for the Symposium on Structure and Function of Heart Muscle, Ontario Heart Foundation. Dr. J. C. Richardson was elected President of the Medico-Legal Society of Toronto. Dr. E. R. Yendt was Visiting Professor of Medicine at Union Memorial Hospital, Baltimore.

Professor D. E. Cannell, Dr. J. L. M. Bean, and Dr. J. R. Norris were elected to Fellowship in the Royal College of Obstetricians and Gynaecologists, London. Dr. R. G. C. Kelly is President of the Seventh Pan-American Congress of Ophthalmology and Secretary of the Canadian Ophthalmological Society. Dr. J. C. Hill was the first Canadian to receive the Certificate of Award in Ophthalmology from the American Academy of Ophthalmology and Otolaryngology. Dr. J. S. Crawford is on the Council of the Canadian Ophthalmological Society and is Chairman of the East Central Section of the Association for Research in Ophthalmology. Dr. G. A. Thompson is Medical Director of the Eye Bank of Canada, Ontario Division.

Dr. T. D. R. Briant was elected Secretary of the Section of Otolaryngology, Academy of Medicine. Dr. H. O. Barber was made a Fellow of the American Laryngological, Rhinological, and Otological Society, and received the Mosher Award for his thesis. Professor G. F. Dohlman was made an Honorary Fellow of the American Otological and the American Triological societies. Dr. Blair Fearon, Chairman of the Otolaryngology Section, Academy of Medicine, was re-elected to the Council of the American Broncho-Esophagological Association and was elected to membership in the American Laryngological Association and Honorary Membership of the Central New York State Eye, Ear, Nose, and Throat Society. Dr. W. H. Johnson was guest speaker at the opening of the First British Academic Conference in Otolaryngology, Royal College of Physicians and Surgeons of London, and presented a lecture on Vestibular Testing to the University Hospital in Basle, Switzerland. Dr. Page Statten was appointed to the World Committee on Speech and Hearing of the International Society for Rehabilitation of the Disabled, and was elected to the Board of Directors of the Canadian Hearing Society.

Dr. Wm. Anderson was elected Chairman of the Section of Clinical Pathology of the Ontario Medical Association. Dr. T. C. Brown was elected Vice-President of the Toronto Academy of Medicine. Dr. C. Ezrin was Chairman of an international committee to standardize pituitary cell nomenclature.

Dr. J. W. Steiner was elected to the Editorial Board of the *American Journal of Pathology*. He lectured at the University of Paris and the Research Centre at Villejuif at the invitation of the Bureau of Cultural Relations of the Ministry of Foreign Affairs. Dr. H. W. Bain was made Chairman of the Economics Committee of the Ontario Medical Association and a member of the American Pediatric Society. Dr. J. E. Boone received the Travelling Fellowship of the Canadian Arthritis and Rheumatism Society to visit Great Britain and Scandinavia. Dr. A. Chlebus was appointed Chief of Paediatrics at the Humber Memorial Hospital and was made a Fellow of the Royal College of Physicians and Surgeons. Professor A. L. Chute attended the Governor General's Conference in Ottawa on the Family. Dr. D. Crozier was made Chairman of the Medical Advisory Committee, Ontario Crippled Children's Society, and a member of the Canadian Rehabilitation Council for the Disabled. Dr. J. H. Ebbs was appointed by the Governor General to the Special Advisory Committee of the Duke of Edinburgh Awards. He was made a Fellow of the Royal College of Physicians of London, and was Visiting Professor at the University College Hospital of the West Indies. Dr. R. J. Imrie was appointed Director of the Ontario Safety League. Dr. B. Laski was a Visiting Lecturer at the University of the West Indies. Dr. D. M. McLean was made a member of the College of Pathologists of Great Britain and a Fellow of the American Academy of Microbiology. Dr. E. G. Murphy participated in the first Symposium on Muscle Structure and Function as part of the celebrations of the fiftieth year of the Medical Faculty of the University of Alberta. Dr. J. S. Prichard attended the International Symposium of Neo-Natal Neurology and Electro-Encephalography in Houston, and was a Visiting Lecturer at the University of the West Indies. Dr. L. N. Silverthorne was elected President of the Christian Medical Society of Ontario. Dr. C. E. Snelling was appointed Chair-

man of the Nominating Committee of the American Academy of Pediatrics. Dr. J. A. P. Turner was a Visiting Lecturer at the University of the West Indies. Dr. M. Sonley was admitted to Fellowship in the Royal College of Physicians and Surgeons of Canada.

Professor E. A. Sellers was elected Vice-President and Professor W. Kalow became Past President of the Pharmacological Society of Canada. Professor Kalow also served as a member of an international panel on the Screening of Drugs. Dr. W. J. R. Taylor was made a Fellow of the American College of Clinical Pharmacology and Chemotherapeutics and Dr. A. Diosy became a Fellow of the Royal College of Physicians and Surgeons of Canada. Members of the staff in the Department of Pharmacology gave papers or chaired sessions at the Second International Pharmacological Meeting in Prague, the International Congress of Genetics in the Hague, the Symposium on Structure and Function of Heart Muscle, Toronto, the Federation of American Societies for Experimental Biology, Chicago, and the Canadian Federation, Halifax; the Universities of Illinois, Wisconsin, Western Ontario, Columbia, and the New York Academy of Sciences are included in the list of institutions at which scholarly addresses were presented. Professor A. B. Stokes was elected Vice-President of the American Psychiatric Association. Dr. J. D. Atcheson was elected President of the Ontario Psychiatric Association. Dr. K. G. Gray was made an Honorary Member of the Registered Nurses' Association of Ontario.

Dr. R. B. Holmes was a Visiting Professor of Radiology at McGill University. Dr. R. A. Lobb was elected President of the Canadian Association of Radiologists. Professor F. G. Kergin was an invited lecturer at the Seventh Medical Assembly of the West at Guadalajara, Mexico, and Visiting Professor at the University of Rochester School of Medicine and Dentistry and the Middlesex Hospital Medical School. Dr. W. G. Bigelow was the Royal College of Surgeons of Canada Lecturer in Surgery for 1964. Dr. R. D. Jeffs was guest speaker at the North Pacific Pediatric Society. Dr. W. K. Lindsay was elected President of the Canadian Association of Plastic Surgeons. Dr. Burns Plewes was elected President of the Toronto Academy of Medicine. Dr. R. B. Salter was elected a Fellow of the British Orthopaedic Association, Honorary Member of the Philadelphia Orthopedic Society, and appointed to the National Surgical Advisory Board of the Shrine Hospitals of North America. He was a Visiting Professor of Orthopedic Surgery at the University of Tübingen, Vanderbilt University, Columbia University, University of the West Indies, University of Southern California, Marquette University, and McGill University. He was a Lecturer in Orthopedic Surgery to the Michigan Orthopedic Society, Newington Crippled Children's Alumnae Association, University of Ottawa, Queen's University, New Jersey Orthopedic Society, and Boston Orthopedic Club.

Visitors

We were delighted to welcome to various departments of the Faculty the following visitors during the past year: Professor E. A. Pask, University of Newcastle; Professor H. O. Thomas, University of Lagos Medical School, Nigeria; Professor James D. Payne, Royal College of Surgeons of England; Professor E. G. L. Bywaters, Dr. J. V. Dacie, Dr. C. Wilson, and Professor Sheila Sherlock of London, England; Dr. Pierre Grabar of Paris; Dr. A. C. Taquini of Buenos Aires; Professor Lance Townsend of Melbourne, Australia; Dr. Ian MacGillivray and Dr. G. W. Theobald of London; Dr. Charles Taylor of Birmingham; Dr. Derrick Vail of Chicago; Dr. Webb P. Chamberlain of Cleveland; Mr. J. H. Redmond Smith of London, England; Dr. Nome Baker, Los Angeles; Dr. Sara Schiller, New York; Dr. Lennart Roden, Chicago; Mr. R. S. Handley of the Middlesex Hospital Medical School; Dr. John W. Kirklin of Rochester, Minnesota; Professor J. H. Louw of Cape Town; Mr. Ronald Belsey of England.

The Balfour Lecture was delivered by Dr. John W. Kirklin of Rochester, Minnesota; the Dr. Harry Shields Lecture by Professor E. A. Pask of the University of Newcastle; and the Walter W. Wright Lecture by Dr. Derrick Vail of Chicago.

The Medical Alumni Association again entertained the graduating class the

evening before Convocation and had as guests the classes of 1904 and 1914. The address to the class of 1914 was given by Dr. Duncan Graham, Emeritus Professor of Medicine, and responded to by Dr. H. K. Detweiler, Emeritus Professor of Medicine and formerly Head of the Department of Medicine in the Toronto Western Hospital. At the Convocation of June 17, Dr. H. Rocke Robertson, Principal of McGill University and formerly Professor of Surgery at McGill University, received an honorary LL.D. degree and gave the address. One hundred and thirty-one students graduated. Diplomas were awarded to 1 student in Industrial Health, 7 in Medical Radiology, and 20 in Psychiatry. At the Convocation of June 1, diplomas in Physical and Occupational Therapy were awarded to 73 students and in Speech Pathology and Audiology to 5 students. The degree of Bachelor of Science (Medicine) was awarded to 2 students on June 17.

On behalf of the Faculty of Medicine, I wish to express our deepest appreciation of the support of medical research given by many individual donors. At the same time, medical research in this Faculty could not exist without the generous support given by many agencies, including the Atkinson Charitable Foundation, the J. P. Bickell Foundation, the National and Ontario Heart Foundation, the Canadian Arthritis and Rheumatism Society, the Canadian National Institute for the Blind, the National Cancer Institute, the Ontario Cancer Treatment and Research Foundation, the Canadian and Ontario Cancer Societies, the McLaughlin Foundation, the Markle Foundation, the National Institutes of Health of the United States, the Alcoholism and Drug Addiction Foundation, the Cummings Foundation, the Medical Research Council, the Province of Ontario, the Department of National Health and Welfare, and the Defence Research Board.

I should also at this time like to express our particular appreciation to S. C. Johnson & Son Limited of Brantford which has renewed its support to the Institute of Biomedical Electronics and the Steroid Laboratory of the Department of Obstetrics and Gynaecology.

The reorganization of the Office of the Dean undertaken on January 1, 1964, has done much to lighten an increasingly onerous administrative burden. The appointment of Dr. W. R. Feasby as Executive Assistant to the Dean has already resulted in major improvements in dealing with the University budget and research funds. Miss Cassidy, Secretary of the Faculty, has continued to be a major support in all administrative matters in this office. To the secretarial staff I am much indebted for their loyal co-operation and assistance. To the President and Faculty Council I wish to express my deep appreciation for their continuing encouragement and help during a difficult year.

JOHN HAMILTON

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor R. Ian Macdonald

During the 1963-64 session 1,568 students were registered with the Division. Four hundred and ninety-five were graduate students, all but 13 of whom were working and studying full time in different clinical and basic science Departments. The 13 exceptions were enrolled in part time (summer) courses proceeding to the B.Sc. (Med.) degree. There were 99 graduates enrolled in Diploma Courses, 83 registered for sessional courses and 291 were internes, residents, or Fellows training under the direct supervision of members of the Faculty. One thousand and seven doctors in active practice attended one or more of the twenty-three special refresher courses designed particularly to meet their different needs. The Faculty offered again advanced graduate courses extending over a six weeks' period and designed for graduates who had either completed their training fairly recently or who were anxious to have old knowledge refreshed and to find out the latest opinions about new advances in Medicine, Surgery, and Obstetrics and Gynaecology. Sixty-six

students from different parts of Canada came to Toronto for these courses and it is significant that many of them were graduates not only from different Schools in Canada but also from those in the United Kingdom and Europe.

The twenty-three special refresher courses imposed heavy burdens on the Departments concerned but the general consensus was that the effort was very well worthwhile. In offering these courses, designed to meet the needs of men in active practice, the School discharged a responsibility not only to its own graduates but to the medical community generally. Because of the special needs of the men registered for the courses particular attention was directed to the application of a new knowledge of problems met with in practice. Some of the courses, such as the Eighth Annual Course in Radioactive Isotopes, were highly specialized and attracted doctors from all across the country. Others were more general and were of particular interest to doctors in general practice in Ontario. The Seventh Annual Refresher Course in Public Health, given in the School of Hygiene by the staff of the School with the help of some visiting teachers, was of wide interest to workers in the field and this too attracted people from all across the country. The Eye Surgery Clinical Meeting, which has been offered for a number of years, again brought ophthalmologists from many parts of the country to share experience with our own staff and the visiting teachers.

As in previous years the amount of faculty teaching time devoted to these courses was very substantial. The choice of subjects and the preparation of material suitable for the experienced colleagues who came for the courses required judgment and time.

The decentralized clinic programme, now in its thirteenth year, sent twenty teams of University teachers to seven centres in Ontario. Each of these clinics gave opportunities for doctors to participate in an active postgraduate training programme in their own home areas.

During the year the Director of the Division served as a member of the Education Committee of the Ontario Medical Association.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Professor A. T. Jousse

Instruction was again provided by the Division of Rehabilitation Medicine to students in Medicine, Physical Therapy, Occupational Therapy, and Speech Pathology. Graduate training was offered to the physicians and physical therapists; the former to enable them to train as physiatrists, the latter as teachers of physical therapy. A postgraduate course of three days' duration was offered to physical therapists through the Division of Post Graduate Medical Education, and a course for rehabilitation nursing was offered to graduate nurses through the School of Nursing with the cooperation of this Division.

The following received instruction during 1963-64:

GRADUATE	
Physiatrists	2
Speech Pathology and Audiology	17
Postgraduate course in Physical Therapy	4
UNDERGRADUATE	
Medicine	
Third year	129
Fourth year	133
Physical and Occupational Therapy	290

At the June Convocation, 2 received diplomas as teachers of Physiotherapy, 73 in Physical and Occupational Therapy and 5 in Speech Pathology and Audiology.

The number noted above are such as to strain our facilities to the utmost. Accommodation for staff and secretarial help is not adequate. The students do not have room in their lounge to eat lunch and the lockers located in the corridors provide a less than ideal location for changing of uniforms.

Shortage of space due to the ever increasing number of students hampers our efforts to improve instruction and carry out investigations. Despite these difficulties, the investigations into the incidence of speech defects amongst school children continue. In fact, based on this study an award from the Atkinson Foundation has made possible the holding of a summer clinic for the treatment of school children, who by virtue of their location outside of large centres might not otherwise be enabled to receive treatment. At the same time instruction is being offered to speech pathologists, speech correctionists, public health nurses, and other interested persons through the Division of Postgraduate Medical Education.

Miss Hazel Lloyd who joined our staff as a teacher of physical therapy a year ago, will leave to assume similar duties at Dalhousie University in Halifax on July 1.

Miss Sally Morgan, another teacher of physical therapy is taking a sabbatical year for study and travel in order that she may gain new viewpoints. These two positions will be filled by Miss Faris and Mr. Helewa who have just completed their training.

Mrs. Gacich will be replaced temporarily by Miss Bass who is coming from England. Mrs. Gacich will, we hope, return to our staff when her family have grown able to care for themselves.

Dr. Crawford spent three weeks in London, England at St. Thomas' Hospital re-assessing the position of electrodiagnosis and electrotherapy in the practice of clinical medicine.

Dr. W. Franks spent the past year in Britain studying Physical Medicine and Rehabilitation on a fellowship provided by Toronto Western Hospital. He will remain there on scholarship for another six months.

RESEARCH

The research projects directed by Dr. John Crawford at the Toronto Western Hospital have furthered the study of the lower extremity amputee and the problem of dysphasia in the hemiplegic.

Further study in Dr. Godfrey's department at the Wellesley Hospital has led to the development of the lower extremity brace for the early mobilization of the patient with a fractured surgical neck of the femur.

Evaluation of the results of last year's study of speech defects in school children is approaching completion.

Continuing clinical studies are being undertaken at Lyndhurst Lodge to determine the effect of surgery on spinal cord injuries and the recovery of neurological functioning.

PUBLICATIONS

GODFREY, C. M. "Communication and Vocational Rehabilitation of the Disabled" (*Rehabilitation in Canada*, summer, 1963).

——— "Listen to Your Patient's Voice" (*Consultant*, April, 1964, pp. 20-5).

——— "Physical Fitness" (*Modern Medicine of Canada*; reprinted in *Journal of the Canadian Association of Health, Physical Education and Recreation*, vol. 30, no. 4, April, 1964, pp. 16-8).

GODFREY, C. M. and BRAZIER, S. "A Facial Prosthetic Unit" (*Ontario Medical Review*, vol. 29, no. 11, Nov., 1962, pp. 897-9).

GODFREY, C. M. and JOUSSE, A. T. "Rehabilitation Facilities in Ontario" (*Canadian Medical Association Journal*, vol. 89, no. 13, Sept. 28, 1963, pp. 657-62).

GODFREY, C. M., with LAWSON, G. A. and ROWSELL, H. C. "Histological Effects on Swine of Ultrasonic Radiation in the Medical Therapeutic Range" (*Medical Services Journal*, vol. 19, no. 3, March, 1963, pp. 177-82).

JOUSSE, A. T. "The Management of Paraplegia" (*Manitoba Medical Review*, vol. 43, no. 7, Aug.-Sept., 1963, pp. 383-91).

MEDICAL SOCIETY

(September 1963 to June 1964)

<i>Honorary President</i>	. . . . .	Dean John D. Hamilton
<i>Honorary Secretary-Treasurer</i>	. . . . .	Dr. R. W. Gunton
<i>Chairman</i>	. . . . .	Dr. Douglas Wilson
<i>President</i>	. . . . .	Wm. Dixon
<i>Vice-President</i>	. . . . .	Wm. Sturtridge
<i>Treasurer</i>	. . . . .	Dave Ellis
<i>Secretary</i>	. . . . .	Joan Dixon

The 1963-64 session of the Medical Society Assembly has been one of the most rewarding for several years. Because of the excellent budgeting of the previous assembly, we were solvent, and could expand our activities. In addition, the meetings were the shortest on record because of the excellent chairmanship of Dr. Doug. Wilson.

Dave Ellis has done a fine job as treasurer, keeping the members within their budget. As usual, our budget has been supplemented with Duncan Room profits. Although this system keeps us out of debt, it allows no accumulation of capital for furniture replacement; therefore, should new furniture be needed, the question of an increased grant from Simcoe Hall must be raised again.

There was no fall dance this year. The Medical At Home was a social success but a financial failure because the very bad storm on February 6 made it impossible for people to reach the Royal York. As a result, sale of tickets at the door was negligible. Those who could attend enjoyed the evening immensely and appreciated the work and excellent planning of Bill Sturtridge and his committee.

The Medical Athletic Association with its record budget had one of its finest years. We placed second for the Reed trophy, and were able to buy much needed new equipment. The Golf tournament was a great success, and Bill Cawkell introduced a Ski Day which was equally enjoyable and promises to be a Winter highlight for years to come.

Linda Geiger has kept us up-to-date on activities of the Medical Women's Undergraduate Association. A \$500 grant to improve the amenities of the girls' common room should greatly help the crowded room meet the needs of an increasing body of female medical students.

Chris Varty as Warden has done a highly efficient job looking after the Duncan Room and the Society's office. He has kept the profits rolling in while keeping the non-medical students out so we can enjoy our common room.

The *Medical Journal* was consistently late in appearing this year, but co-editors Bill Crysedale and Fred Langer have maintained the high calibre of articles and produced an attractive and informative volume. *Probe*, edited by Sandy Logan, again became an informative and extremely controversial news medium. It supplied the students with detailed news and pictures of Meds' activities.

A number of surveys of student opinion of the Physiology, Biochemistry, Public Health, and other courses were undertaken this year by Sam Malcolmson and his committee. Recommendations based on the surveys were submitted to the curriculum committee for consideration.

The annual Staff-Student Smoker was again an evening to remember. The freshman banquet was informal this year—no head table. The students sat with their future clinicians and heard brief talks about Medical Society activities. The Drill Hall dance was very successful as were the campus tours and hospital visits planned by Nick Moore.

P & OT girls were invited to participate in our Daffydil show this year. The brilliant writing, good censorship, and chairmanship of Gerry Myers made it the best Daffydil in many years.

Mr. Hatschinski managed the Arts & Letters Club to give us most interesting and

diversive activities. Art displays at TGH and the Duncan Room, good debates, student papers presented at Osler Society meetings were but a few of the highlights.

Don Waugh and Ron Peroff have looked after our exam reprints and instruments as well as other C.A.M.S.I. activities.

The book drive and Share campaign had a good year under J. R. Wright. Also, Meds has Peter Culbert as a W.U.S. representative to Algeria.

Liz Ross, our vivacious representative to C.U.S. convinced us to withdraw from that organization although it offered student discount cards and other benefits. Miss Ross considered such benefits insignificant.

Our two representatives to the S.A.C., Joyce Dunnison and Richard Tan were excellent and kept us informed on such lively issues as the bookstore boycott, parking on campus, the March on Queen's Park, and so on.

The Blue and White representatives, Stu MacLeod and Mary Robertson, ably looked after Meds' participation in events such as Homecoming, Winter Carnival, and so on.

George Watkin, Ken Shumak, Mike Thompson, Terry Picton, Brian Hands, and Don Simpson have all done commendable jobs as Year Presidents in expressing the views of their classes to the Assembly, and have served well on various sub-committees.

The thankless job of recording minutes, writing letters, and overworking the duplicating machine has been done with enthusiasm and interest by Joan Dixon, our Secretary.

There were several Constitutional changes—the most important was changing the system of voting to an "X" instead of using the Hare-Spence system, permitting the appointment of assembly members in the fall if necessary, and electing the Blue and White representatives at the same time as the S.A.C. representatives.

A file card index listing of summer jobs was established in the Medical Office for student reference. The honour awards for service to the Faculty in undergraduate years were made to Wm. Crysdale, Wm. Cawkell, Wm. Dixon, F. Langer, S. Malcolmson, B. McGrath, D. Scroggie, H. Tanzer, and G. Watkin.

I should like to say a special word of thanks to our Honorary President, Dean Hamilton, for his enthusiastic support of the Society's activities this year.

In conclusion, I wish to thank the members of the Assembly for the support I received. To the incoming executive, I extend best wishes for a successful year.

WILLIAM S. DIXON

MEDICAL ATHLETIC ASSOCIATION

(September 1963 to June 1964)

<i>Honorary President</i>	. . . . .	Dr. John Evans
<i>Honorary Secretary-Treasurer</i>	. . . . .	Hal Brown
<i>President</i>	. . . . .	W. Cawkell
<i>Vice-President</i>	. . . . .	R. McGee
<i>Secretary-Treasurer</i>	. . . . .	G. Magee
<i>Publicity Director</i>	. . . . .	I. Sinclair
<i>Quartermaster</i>	. . . . .	R. Repo
YEAR REPRESENTATIVES		
<i>IV Medical Year</i>	. . . . .	L. Schwartz
<i>III Medical Year</i>	. . . . .	L. Silverberg
<i>II Medical Year</i>	. . . . .	J. Mueller
<i>I Medical Year</i>	. . . . .	J. Maki
<i>II Premedical Year</i>	. . . . .	D. Mather
<i>I Premedical Year</i>	. . . . .	C. Frewin

The 1963-64 executive of the Medical Athletic Association devoted itself to improving the organization of the Association as well as stimulating participation in athletics. Year representatives were given specific duties according to their office. The first premedical representative, Carlos Frewin, is in charge of the M.A.A. year book, which will have a picture of every medical team, together with the names of the players and the team record. He has worked dutifully to make this concept a reality. The second premedical representative, Dave Mather, tabulated athletic points for every medical student on a card system so that athletic honours may be more efficiently awarded. Mr. Mather continued the work begun by Raimo Repo two years ago. The chore of keeping up to date the Athletic trophies in the Duncan Room show case was given to the first medical year representative, John Maki.

The post of Athletic Quartermaster was changed to a two year appointment, with renewal at the discretion of the new executive and requiring six months' apprenticeship under the outgoing Quartermaster. Raimo Repo showed exceptional interest in the M.A.A. in serving as Quartermaster for the past two years. He has begun a programme of replacement and improvement of equipment and athletic stores.

In inter-faculty competition this year the Faculty of Medicine excelled. In the fall term, fourth year Medicine won the minor league Volley Ball. At the inter-faculty Track Meet, Rod Chintu distinguished himself by winning the Cody Trophy for the best all round performance. The football team, with 35 players on the roster was defeated in the quarter finals after being successful in 3 of their 5 season games. The soccer team fell short of their expectations, being upset in the quarter finals. Medicine entered four rugger teams in the newly popular lunch hour Rugger League. A combined third and fourth year team upset the favoured first medical year team but was defeated in the quarter finals. Terry Picton has done much to stimulate interest in rugger among Medical students. The annual Golf Day was successful. Fifty-five golfers competed for various trophies. Howard Kidman had the best round for the day. The event was highlighted by a banquet at which Dean Hamilton presided and Dr. Tait McPhedran was the guest speaker.

In the spring term, fourth year Medicine water polo team won the highly competitive inter-faculty league, defeating an exceptional first year Medicine team in the semi-finals. Alex Furnesse directed Medical water polo and maintained the three year Medical supremacy in this sport which began under George Watkin. In hockey and basketball, Medicine entered fine first teams which were both eliminated in the quarter finals. George Watkin organized squash teams among Medical students and entered a record nine Medical teams in the inter-faculty league as well as running the Medical inter-faculty squash competition.

The spring season was highlighted by an innovation—a Ski Day at Blue Mountain. Dean Hamilton continued his support of Medical Athletics, attending the full day's activities on the hills as well as the banquet after. Doctor Paul McGoeys also spent the day with the students and was the guest speaker at the banquet.

The Awards Banquet was a great success. In the Dean's unavoidable absence, Dr. K. J. R. Wightman represented the Faculty and the Honorary President, Dr. John Evans and Honorary Secretary-Treasurer, Hal Brown were speakers. Thirty-three Medical "M's" were awarded and twelve Athletic Mugs. Nolan Kane won the Tom Boeschstein Award which is given to the student from the premedical course who has contributed most to intramural athletics. At the banquet, an announcement was made that the Faculty of Medicine finished the year second only to Physical Education in competition for the T. A. Reed Trophy, proof of this year's fine athletic ability, participation, and organization.

I would like to thank this year's executive for their enthusiasm and co-operation. It is with every confidence that I wish Bob McGee and the in-coming executive success in the coming year.

W. CAWKELL

MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September 1963–June 1964)

<i>Honorary President</i>	. . . . .	Dr. Henrietta Banting
<i>President</i>	. . . . .	Linda Geiger
<i>Vice-President</i>	. . . . .	Dagnia Kalnins
<i>Treasurer</i>	. . . . .	Joanne Gear
<i>Secretary</i>	. . . . .	Ann Mitchell
<i>Social Convener</i>	. . . . .	Ann Warwood
<i>I Premedical Representative</i>	. . . . .	Carol Davison
<i>S.A.C. Representative</i>	. . . . .	Joyce Dunnison

The year 1963–64 was an average one for the Medical Women's Undergraduate Association. A record membership of 119 with a high percentage participating in the activities of the association made all of our efforts worthwhile.

In September, we welcomed the newcomers to the Faculty and the girls were entertained by the graduating class at an informal gathering. The second premedical girls experimented with a big sister programme for the girls in the first premedical year. After a year's experience, this project has gained unanimous support.

The Initiation Banquet was held in October at Peppio's Restaurant. Mrs. Barbara Duckworth, fashion co-ordinator for Eatons, delivered an animated fashion talk.

In November, the Federation of Medical Women held its annual tea which included a tour of Women's College Hospital. This event was well attended, although the majority of those present were from first and second year.

Gifts for the University Settlement House were collected at our Christmas party in December. Considering our roll-call, the donation to this cause was meagre. Following the party, reports and future events were discussed, and entertainment was provided by the third-year medical students.

In early March we discussed the problems of unmarried mothers with Major Mary Webb and Dr. Loughheed. For some years Major Webb directed a home for unwed mothers in Toronto, and has recently been involved in a governmental study of teen-age marriages.

The graduating class was honoured twice; first, there was a party given by the third-year girls, and secondly, the banquet of the Medical Women's Federation at the Rosedale Golf Course in April.

Through the Medical Society, the M.W.U.A. received a bequest of five hundred dollars to be used to improve the facilities of the common room. The delayed receipt of the carpenter's estimate made completion of the plans impossible during this season. It is hoped that the proposed changes will be accomplished during the summer vacation. In addition, a new table and bench will be delivered in September.

I would like to thank my executive for their support and Dr. Banting for her active interest. I hope that Ann Haag and the incoming executive enjoy the coming year as much as I have this one past.

LINDA GEIGER

MEDICAL WOMEN'S UNDERGRADUATE ATHLETIC ASSOCIATION

(September 1963–June 1964)

<i>President</i>	. . . . .	Patti Gair
<i>Vice-President</i>	. . . . .	Eva Vidins
<i>Secretary</i>	. . . . .	Karen Cronin
<i>Treasurer</i>	. . . . .	Gail Ponting

The Athletic Directorate of the University offered the traditional programme of individual and team sports this year with the added attraction of field hockey.

It was the responsibility of the Medical Women's Athletic Association executive to encourage participation in these activities by the women undergraduates of the Faculty. The response was, as usual, greatest in the popular team sports such as basketball, hockey, and volleyball and the newly introduced field hockey, but participation in the individual sports—tennis, badminton, archery and bowling—was disappointing.

Apart from the pleasures of fellowship and physical exercise, team-sport participation offers an excellent opportunity for getting to know students in other years—students who will one day be colleagues. However, the M.W.A.A. executive strongly recommends that undergraduates be encouraged to acquire and maintain some degree of skill in the individual sports, since these are the “carry-over” sports which will provide recreation and exercise long after University has been left behind.

The athletic season for Meds girls opened very early this year with field hockey which was scheduled during noon hours at Varsity Stadium. This popular new sport gained most of its support from the girls of second Meds, most of whom had never played before. The best effort was a tie game with Phys. Ed. but the experience gained this year should help to improve Meds chances next year.

Meds girls also participated in the Swim Meet in the fall and Pat Blachford of first Premeds was a member of the championship Intercollegiate Swim Team.

Basketball was also played in the fall term and Meds managed a very creditable record of three wins and two losses in the third league. The M.W.A.A. was not entirely satisfied with the organization of the basketball league and has some recommendations to make for next year.

Once again, the most popular sport offered was ice hockey. The Meds team, coached by Jim Boyce of second year Meds, had probably its most successful season. Playing in the second league, the team won all of its regular season games by shut-outs, and players from the Meds team placed first, second and third in league scoring. The team's only defeat of the season was by first year Phys. Ed. in the semi-final. On the strength of their showing this past year, Meds will probably advance to the first league, where the stiffer competition will likely help to increase the skill of the players.

Patti Gair of second year Meds was a member of the championship Intercollegiate hockey team and it is hoped that a few more girls from Meds will be members of this team next year.

The Volleyball team also had an excellent record this year of four wins and two losses but lost out in the semi-finals.

The annual banquet, traditional wind-up of the athletic season, was held at the Nanking restaurant and featured the presentation of awards. Four girls from second year Premeds received their Premeds athletic awards and one junior colour and one Senior “T” were presented by the University Athletic Directorate. Following the dinner and presentations, a highly interesting film of the 1954 British Empire Games at Vancouver was shown.

This year's executive thoroughly enjoyed its responsibilities in co-ordinating the women's athletics in the Faculty and, since the executive for 1964–65 is essentially the same, we have many plans for increasing the participation in athletics next year.

PATTI GAIR

BIOLOGICAL AND MEDICAL DIVISION UNIVERSITY LIBRARY

Reported by Mr. P. Steckl

The general pattern of development of the Biological and Medical Division of the University Library was established when it came into existence in 1962 as one of the two component parts of the Science and Medicine Department.

The Library Committee of the Faculty of Medicine under the chairmanship of A. G. Gornall took a lively interest in the Division and initiated the following three projects: A review of the medical book collection, which is to be conducted every five years by members of the Faculty of Medicine, was completed and many of the gaps were filled by purchases. A survey of its journal holdings was undertaken and duplicate subscriptions were placed for a number of titles, mainly in the field of genetics. A further list of outstanding periodicals was drawn up and orders placed for twenty-five new titles. It is hoped that subscriptions for the remainder can be initiated over the next four years, at the rate of twenty-five titles per annum.

The anticipated move of the Department of Zoology to its new quarters will make its library less accessible for members and students of the Faculty of Medicine.

A preliminary draft of the survey of libraries serving Canadian medical colleges was received; its publication is expected in the near future. It is hoped that it will be possible to keep up-to-date some of the statistical and other information compiled for this report and to publish it as the need arises.

REPORT ON REGISTRATION, SESSION 1964-65

First Premedical Year	131
Second Premedical Year	119
First Medical Year	176
Second Medical Year	147
Third Medical Year	158
Fourth Medical Year	126
Special Students	4
Art as Applied to Medicine	4
Bachelor of Science (Medicine)	8
Bachelor of Science (Medicine) Summer Session	13
(also registered in medical undergraduate years)	
Diploma in Medical Radiology	19
Diploma in Psychiatry	40
Diploma in Industrial Health	—
Diploma in Anaesthesia	24
Graduate Students	249
Physical and Occupational Therapy	293
Speech Pathology and Audiology	18
Student Teachers	4
	<hr/>
	1533

FELLOWSHIPS, SCHOLARSHIPS, MEDALS, AND PRIZES

Awarded at Convocation, June, 1964

GRADUATE

Graham Campbell Prize	H. O. Barber, M.D., F.R.C.S.(C)
Canadian National Institute for the Blind Fellowships	J. R. Miller, M.D. J. R. Elder, M.D.
W. P. Caven Memorial Fellowship	C. T. Chou, B.Sc., M.D., M.Sc.
William Goldie Prize	E. A. McCulloch, M.D., F.R.C.P.(C)
Stuart Alan Hoffman Memorial Prize	D. Ostrovsky, M.S.A., B.C.
Arch Hutchison Fellowship	R. Volpé, M.D., F.R.C.P.(C)
Frances Esther Hutchison Fellowship	H. C. Palter, M.D.
Lister Prize	R. J. Baird, M.D., B.Sc.(Med.), F.R.C.S.(C)
James H. Richardson Research Fellowship	J. G. Ashby, M.D.
Starr Medal	D. C. MacGregor, M.D.

John Alexander Stewart Fellowships	J. L. Silversides, B.Sc., M.D. (Man.) M. Cohanin, M.D. (Tehran)
Helen L. Vanderveer Fellowship	D. A. Dotten, M.D.

UNDERGRADUATE
Fourth Medical Year

Cody Gold Medal	M. A. Singer
Cody Silver Medal	W. J. Weiser
Cody Silver Medal	F. Langer
Dr. Benjamin W. Appleton Prize in Psychiatry	W. J. Weiser
Butterworth Prize	J. F. Murray
J. P. Boley Prize in Ophthalmology	R. M. Gladstone
Chappell Prize in Clinical Medicine	W. J. Weiser
Dr. Jacob Goldstein Scholarship	C. C. Gold
Hendry Memorial Scholarship	R. M. Gladstone
Issei Scholarship in Medicine and Surgery	Miss K. J. Whytock
Dr. Louis Kagan Memorial Award	R. M. Gladstone
Dr. Thomas Arnold McCormick Scholarship	H. Tanzer
Medal of the Consul General of France	A. J. D. Pudden
Medical Alumni Association Scholarship	C. C. Gold
Ellen Mickle Fellowship	M. A. Singer
Modern Medicine of Canada Award in Medical History	F. W. Furlong
Mosby Awards	W. A. Cawkell T. P. Corkum W. S. Dixon M. G. Schiller W. W. Weston
Ontario Medical Association Prize in Preventive Medicine	D. M. C. Wilson
Dr. and Mrs. M. A. Pollock Award	A. J. D. Pudden
Dr. Roy Simpson Scholarship in Paediatrics	R. M. Gladstone
Starkman Memorial Scholarship in Medicine	W. J. Weiser

Third Medical Year

Class of Medicine 1924 War Service Scholarship	J. H. Levine
Franckel Memorial Award	K. H. Shumak
Charles E. Frosst Scholarship	R. P. Orange
J. F. Hartz Company Prize in Ophthalmology	G. R. Van Loon
J. F. Hartz Company Prize in Oto-Laryngology	K. H. Shumak
Frank W. Horner Gold Medal	D. N. Steele
Samuel and Minnie Rotman Scholarship	J. E. J. Schuman
Saddington Medal in Pathology	K. H. Shumak
Starkman Memorial Prize in Pharmacology and Therapeutics	L. E. Cappe
Starkman Memorial Scholarship in Preventive Medicine	F. Simon
Walter F. Watkins Scholarship	J. E. J. Schuman } <i>Aeq.</i> F. Simon

Second Medical Year

Dr. F. J. Colling Memorial Scholarship	Miss J. J. E. Turley
John Copp Bursary	J. M. Nelems
Plaza Drug Stores Scholarship	M. J. Sole
Posluns Brothers Scholarship	Miss J. J. E. Turley
Sandoz Prize in Pharmacology	M. J. Sole
Walter F. Watkins Scholarship	M. J. Sole } <i>Aeq.</i> N. G. Kee
Special Prize	G. J. Douglas

First Medical Year

Ciba Collection of Medical Illustrations	J. M. Colman	
Starkman Memorial Scholarship in Anatomy	S. Berger	
Dr. C. S. Wainwright Memorial Scholarship	R. I. Hilliard	
Walter F. Watkins Scholarship	M. Bach	} <i>Aeq.</i>
	G. L. Weisbrod	
John Zoberman Scholarship	R. I. Hilliard	

Second Premedical Year

Famous Players Canadian Corporation	
Scholarship	P. F. Halloran
Fulford Scholarship (No. 4 General Hospital)	P. F. Halloran

ANAESTHESIA

Under the direction of Professor R. A. Gordon

The course of lectures given to the third-year students again emphasized subjects of particular interest to the general physician, and were supplemented by demonstrations of anaesthesia at the Hospital for Sick Children. The very small amount of time available for this teaching necessarily limits the instruction to the most elementary level in both range and depth. The clinical teaching to the fourth-year students remained unchanged, but much thought is being given by members of the Department to possible means of better utilizing the time available in this year.

There were 37 postgraduate students in the Department during the year, 25 of whom were registered in the Diploma Course, the remainder being sessional students. Tutorial teaching in the basic sciences has become an established feature of the postgraduate training in the Department, and after a trial of five years is regarded as being superior in every way to the previous lecture course. These tutorials impose a heavy load of work on the few teachers involved, and their loyalty, enthusiasm, and hard work is greatly appreciated.

The Department is pleased to report the success in the examination for the Fellowship of the Royal College of Physicians and Surgeons of Canada of Dr. Shashi Goel, Dr. John Jacobs, Dr. Carla Job, Dr. Sharon Nabeta, Dr. Elizabeth Oliver, Dr. David Pelton, and Dr. William Young, and in the Certification examinations of Dr. William Farrell, Dr. Sandra Cochen, Dr. Michael Diamond, Dr. Peggy Ross, Dr. Harrie Thorn, and Dr. Alvin Spector.

The Diploma in Anaesthesia of the University of Toronto was awarded for the first time at Convocation this year. The successful candidates were Dr. Beverley Britt and Dr. John Moran.

The Department gave a one-week refresher course for General Practitioners with a special interest and experience in Anaesthesia in November 1963, and a refresher course for Specialists in Anaesthesia from April 6 to April 9, 1964. A three-day course in the treatment of Respiratory Insufficiency was given in February in cooperation with the Department of Medicine.

The Fifth Dr. Harry Shields Lecture was given on November 22, 1963 by Professor E. A. Pask of the University of Newcastle. Professor Pask's subject was "Pitfalls and Disappointments in Patient Monitoring."

The Department has been pleased to welcome the following visitors during the year: Professor Udom Poshakrishma, Siriraj Hospital Medical School, Bangkok, Thailand; Dr. Pauline M. Nicholson, Royal Adelaide Hospital, Adelaide, South Australia; Professor E. A. Pask, University of Newcastle, Newcastle-upon-Tyne, England; Dr. W. Norman Rollason, Reader in Anaesthesia, University of Aberdeen;

Dr. John Inksater, Newcastle-upon-Tyne, England; Professor Allan B. Dobkin, Upstate Medical Center, New York State University, Syracuse, New York; Professor H. Orishejolomi Thomas, University of Lagos Medical School, Lagos, Nigeria; Professor James D. Payne, British Oxygen Professor of Anaesthetic Research, Royal College of Surgeons of England.

Dr. Rupert Balfour retires at the end of this session after 36 years of service as a member of this Department. His contribution to the clinical teaching of both undergraduate and graduate students at the Toronto General Hospital has been invaluable, and his services will be greatly missed. The Department is pleased to welcome Dr. Elizabeth Oliver, Dr. William Young, Dr. Peggy Ross, and Dr. David Evans as Clinical Assistants.

Dr. J. E. York has been appointed Special Lecturer in Anaesthesia in the Faculty of Dentistry, and in addition to giving a series of lectures to students in that Faculty he has conducted weekly clinics in dental anaesthesia for students in the Diploma Course in Anaesthesia.

Dr. Shirley Fleming has continued this year as Professor and Head of the Department of Anaesthesia at the University of Lagos Medical School in Nigeria. Dr. R. L. Hooper, a senior postgraduate student in this Department has also spent the year in Lagos as Senior Registrar in Dr. Fleming's Department.

Professor R. A. Gordon visited Nigeria in January 1964 on the invitation of the Dean of the University of Lagos Medical School. During his visit he addressed the Association of Surgeons of West Africa on the subject of "Pre-operative Preparation and Post-operative Care of the Surgical Patient." He also spent some time examining problems involved in the training of Anaesthetists in Nigeria. The Department has undertaken, with the financial assistance of the Educational Division of the External Aid Section of the Department of External Affairs for Canada, to sponsor a continuing programme of assistance to the Department of Anaesthesia of the University of Lagos Medical School.

During the year the following lectures and addresses were given outside the University by members of the Department. DR. EVELYN BATEMAN: "A Quick Screening Test for S.G.O.T. Estimations," Academy of Medicine, Toronto. DR. BEVERLEY BRITT: "The Adequacy of the Air-Mix Control in Gas Operated Ventilators," Canadian Anaesthetists' Society. DR. A. W. CONN: "The Anaesthesiologist and the Operating Room Supervisor," Erie, Pennsylvania; "Anaesthesia for Ocular Surgery in Infants and Children," Canadian Anaesthetists' Society. DR. H. B. FAIRLEY: "The Establishment of Facilities for the Management of Respiratory Insufficiency," Pennsylvania Medical Society; "The Selection of a Mechanical Ventilator," Ontario Thoracic Society; "Recent Advances in Anaesthesia," Sudbury and District Medical Society, North Bay; "Intensive Care," Decentralized Clinic, Kirkland Lake; "An Evaluation of Respirators for the Management of Respiratory Insufficiency," Canadian Anaesthetists' Society; "Acid-Base Disturbances under Clinical Circumstances," Canadian Society of Clinical Chemists. DR. R. A. GORDON: "The Role of the Anaesthetist in the Treatment of Pain," Canadian Forces Hospital, Kingston, Ontario; "The Pre-operative Preparation and Post-operative Care of the Surgical Patient," West African Association of Surgeons; "Regional Anaesthesia in the Treatment of Pain," Atlantic Divisions, Canadian Anaesthetists' Society.

DR. J. C. HENDERSON: "The Incidence of Post-operative Jaundice with Special Reference to Halothane," The Canadian Anaesthetists' Society. DR. MARY HUNTER: "Laboratory and Clinical Studies of the Cardiac Effects of Phenylalanyl-lysyl Vasopressin in Association with Cyclopropane and Halothane," The Canadian Anaesthetists' Society. DR. J. H. KERR: "Neonatal Resuscitation," Hamilton Academy of Medicine; "The Effects of Epidural Analgesia on Airway Conductance," The Canadian Anaesthetists' Society; "The Effects of Smoking on Airway Conductance," The Canadian Anaesthetists' Society. DR. I. M. MACKAY: "The Dying Limb (Round-table)," Ontario Medical Association. DR. B. M. MARSHALL: "Anaesthetic Emergen-

cies in Neurosurgical Procedures—Their Detection and Treatment,” Canadian Anaesthetists’ Society. DR. J. H. MORAN: “The Use of a Neuroleptic in Anaesthesia—Droperidol,” Canadian Anaesthetists’ Society.

DR. I. A. SLOAN: “Anaesthesia for Surgery of Transposition of the Great Vessels,” Academy of Anaesthesiology. DR. J. S. WHALEN: “Improved Techniques in Anaesthetic Management for Repair of Cleft Lips and Cleft Palates,” International Anaesthesia Research Society.

RESEARCH

Dr. H. B. Fairley, with the assistance of Dr. Beverley Britt, has investigated the mechanics of breathing during intermittent positive pressure ventilation. This has involved an investigation of the characteristics of the air-entrainment devices on commercially available gas-operated ventilators. This work has been assisted by grants from the Connaught Trust Endowment Fund and from the Medical Research Council of Canada. In collaboration with Professor A. Rappaport of the Department of Physiology, Dr. Fairley and Dr. Britt have continued an investigation of the effects of changes in ventilation and of anoxia, respiratory acidosis, and respiratory alkalosis on hepatic blood flow. With the assistance of a grant from the Department of Transport of the Province of Ontario Dr. Fairley is collaborating with Dr. F. G. Pearson of the Department of Surgery in a study of the physiology of the Stove-in Chest.

With a grant from the Medical Research Council, Dr. James Kerr has studied the influence of epidural anaesthesia on airway conductance, and has demonstrated that epidural anaesthesia increases bronchopulmonary resistance rather than decreasing it, as has been claimed up to this time. Dr. Kerr has continued his investigation of the effects of smoking on bronchopulmonary resistance, and has initiated a study of the work of breathing in pregnancy which is collecting information relating to respiratory function in pregnancy not previously obtained.

Dr. Brian Marshall and Dr. J. H. Moran have undertaken a study of the usefulness of combinations of new groups of neuroleptic and analgesic drugs in general anaesthesia.

Professor Gordon and Dr. Moran have undertaken an extensive double blind clinical study of a new non-narcotic analgesic drug. This study is continuing. Professor Gordon and Dr. Mary Hunter have studied the cardiac effects of the synthetic octapeptide phenylalanyl-lysyl vasopressin in association with halothane and cyclopropane anaesthesia in cats and in clinical anaesthesia; the clinical study is continuing, but the results suggest that this vasoconstrictor may be safely employed in situations where adrenaline is contraindicated.

At the Hospital for Sick Children, Dr. Sharon Nabeta has been collaborating with Dr. W. T. Mustard of the Department of Surgery in a laboratory study of a new membrane oxygenator for extracorporeal circulation in infants.

Dr. Wm. Jones and Dr. D. Gonzales, at the Toronto Western Hospital, have investigated the influence of anaesthesia with a variety of agents on hepatic function as demonstrated by changes in a standard group of tests.

At the Women’s College Hospital, Dr. Evelyn Bateman is employing a rapid screening test for serum glutamic-oxalacetic transaminase pre- and post-operatively in an endeavour to determine hepatic damage due to anaesthesia or surgery. This work is being supported by the Research Committee of the Women’s College Hospital.

Under the auspices of the Emergency Health Service of the Department of National Health and Welfare, Dr. Iain MacKay and Dr. Margaret Milton have examined the records of a large number of patients anaesthetized following therapeutic doses of ionizing radiation to explore the existence of any consistent pattern of deviation from normal in the reaction of these patients to the stress of anaesthesia and surgery. To date no such pattern has emerged.

PUBLICATIONS

DIX, G. W. "Respiratory and Cardiac Resuscitation" (*Hospital Administration in Canada*, vol. 5, no. 8, Aug., 1963, pp. 10-12).

FAIRLEY, H. B. and BRITT, B. "Adequacy of the Air-Mix Control in Ventilators Operated from Oxygen Source" (*Canadian Medical Association Journal*, vol. 91, no. 24, June 20, 1964, p. 1394).

FAIRLEY, H. B. and HUNTER, D. D. "The Effect of Posture on the Mechanics of Breathing during Intermittent Positive Pressure Respiration" (*Canadian Anaesthetists' Society Journal*, vol. 11, no. 2, March, 1964, pp. 113-22).

—— "Mechanical Ventilators: An Assessment of Two New Machines for Use in the Operating Room" (*ibid.*, vol. 10, no. 4, July, 1963, pp. 364-79).

—— "Performance of Respirators for the Management of Respiratory Insufficiency" (*Canadian Medical Association Journal*, vol. 90, no. 24, June 20, 1964, p. 1397).

FAIRLEY, H. B. and WIGLE, E. D. "Hospital Facilities for the Management of Acute Cardio-respiratory Failure" (*ibid.*, no. 5, Feb. 1, 1964, pp. 376-7).

GORDON, R. A. and GOEL, SHASHI, B. "Intrathecal Phenol Block in Treatment of Intractable Pain of Malignant Disease" (*Canadian Anaesthetists' Society Journal*, vol. 10, no. 4, July, 1963, pp. 357-63).

RELTON, J. E. S. and CONN, A. W. "Anaesthesia for Infants with Tracheal Obstruction" (*Canadian Anaesthetists' Society Journal*, vol. 11, no. 2, March, 1964, pp. 147-58).

—— "Anaesthesia for the Surgical Correction of Scoliosis by the Harrington Rod Method in Children" (*ibid.*, vol. 10, no. 6, Nov., 1963, pp. 603-15).

WHALEN, J. S. and CONN, A. W. "Anaesthetic Management for Repair of Cleft Lips and Cleft Palates" (*Canadian Anaesthetists' Society Journal*, vol. 10, no. 6, Nov., 1963, pp. 584-97).

ANATOMY

Under the direction of Professor J. W. A. Duckworth

During the year 1963-64 there were 1,235 undergraduate and graduate students working in the Department of Anatomy. They were distributed among 29 different courses mentioned below, as follows:

UNDERGRADUATE COURSES IN ANATOMY

1. Medical, First year	170
Rehabilitation Medicine Teachers' Course	2
Graduate Students in Anatomy	3
2. Medical, Second year	166
3. Biology and Medicine, Second year	49
4. Dental, First year	129
5. Dental Hygiene, First year	49
6. Rehabilitation Medicine, First year	106
7. Rehabilitation Medicine, Second year	115
8. Rehabilitation Medicine, Third year	80
9. Physical and Health Education, Second year	47
10. Physical and Health Education, Third year	40
11. Speech Pathology and Audiology	11
12. School of Embalming, First year	65
13. School of Embalming, Second year	69

1,101

GRADUATE COURSES IN ANATOMY

14. Surgery	6
15. Radiology (Diploma course)	11
16. Anaesthesia (Diploma course)	13
17. Obstetrics and Gynaecology (Advanced graduate course)	13
18. Ophthalmology	7
19. Otolaryngology	12
20. Dental Anatomy	10
21. Demonstrators in Gross Anatomy	2
22. Advanced Graduate Course in Surgery	22
23. Functional Anatomy of the Locomotor System	16
24. Anatomy 6	4

116

UNDERGRADUATE COURSES IN MICROSCOPIC ANATOMY		
25.	Medical, First year (included in item 1)	170
26.	Dental, First year (included in item 4)	129
27.	Rehabilitation Medicine First year (included in item 6)	106
		<hr/>
GRADUATE COURSES IN MICROSCOPIC ANATOMY		
28.	Graduate Dental Histology	8
29.	Graduate Histology	10
		<hr/>
		18
		<hr/>
TOTAL		1,235

In the session 1963–64, as compared with 1962–63, there was a slight reduction in the total enrolment in the Department from 1,262 to 1,235 because physical Anthropology in the first premedical year is now taught by the Department of Anthropology.

In the first medical year the most striking feature was the marked difference in the standing achieved by the students in the advanced standing category as compared with those in the premedical category. Those students who had entered the year with advanced standing obtained marks nearly 10 per cent below those who had entered through the premedical years. In addition the failure rate in the advanced standing students was considerably higher.

In the second year Biology and Medicine Course, which is a new course, the general attitude of the students was excellent, with the exception of a few who had entered the course after having failed to be accepted into the first pre-medical year. At the end of the year 46 students remained in the class, and out of this group 6 obtained first class honours, and 10 failed. While it is too early to compare these students with those in the first medical year it is felt that the reduction by 300 hours in the time allotted to Anatomy cannot help but have a serious effect on their anatomical knowledge. The amount of Anatomy that these students will get under the present arrangement will be the lowest in the whole North American continent.

This year the Department welcomed two new members to the staff, Professor J. S. Thompson, from the University of Alberta, and Professor D. L. McLeod, from the Ontario Cancer Institute.

The following lectures and addresses have been given outside the University by members of the Department. PROFESSOR M. C. HALL: "Surgical Experiences in Viet Nam," the Academy of Medicine, Toronto. October, 1963; "Experimental Production of Degenerative Arthritis," the combined meeting of the American, British, and Canadian Orthopaedic Associations in Vancouver. June, 1964; PROFESSOR C. G. SMITH: "The Innervation of the Intrinsic Muscles of the Eye," the Academy of Medicine, Toronto. October, 1963; "The Branches of the Posterior Cerebral Artery that Supply the Visual Area," (joint paper with Dr. F. Richardson), the East-Central Section of the Association for Research in Ophthalmology. January, 1964; PROFESSOR D. L. McLEOD: "Role of Virus in Induction of Tumours, and its Possible Relationships to Carcinoma of the Breast," the Clinical Conference on Carcinoma of the breast, Toronto. November, 1963; PROFESSOR J. S. THOMPSON: "Transplantation of the Mammary Glands in Mice," Invited Seminar Queen's University. February, 1964.

RESEARCH

Dr. S. H. Bensley has continued microscopic and histochemical studies of altered connective tissue with special reference to changes observed in mice with muscular dystrophy and control mice of the dystrophic strain.

Microscopic observations of the circulating blood and intervacular connective tissue of the living iris of anaesthetized mice of the dystrophic strain, by means of quartz rod illumination, revealed haemodilution and anaemia, and many pools of

fluid in the intervascular tissue. This suggested a decrease in the water binding properties of the intercellular substances of both blood and intervascular tissue due either to deficiency of amino acids or a defect in their polymerization. To test this hypothesis two types of experiments were undertaken: 1. the effects of repeated intraperitoneal injections of various amino acids and 2. chromatographic analysis of the amino acids of frozen dry tissue of mice of the dystrophic strain and of two other strains. Although the results of these experiments are not yet complete, the results suggest that repeated intraperitoneal injections of glycine were most effective in restoring haemoconcentration and reducing the pools of fluid in the intervascular tissue.

Dr. Shinshil Chang working under the direction of Dr. Bensley has been conducting two lines of investigation. Exfoliative cytological studies of vaginal smears and washings from mice after repeated intravaginal injections of minute quantities of (*a*) colchicine and (*b*) histamine. Following injections of colchicine the vaginal smears of most mice showed bizarre cells and some mitotic figures suggesting that small amounts of colchicine may stimulate rather than inhibit cell division. However, histological sections of the reproductive organs of these animals indicated that the systemic effects of injected colchicine were more pronounced in the connective tissue of these organs and several mesenchymal tumours were found.

The effects of the histamine injections are still being investigated. Dr. Chang has also investigated the effects of repeated intraperitoneal injections of various amino acids on the muscular performance (as measured by the swim test) of mice of the dystrophic and of three control strains. It was found that repeated injections of glycine were the most effective in increasing the swim time in mice of the dystrophic strain and also seemed to be life-saving in the animals with muscular dystrophy.

Under the direction of Dr. Bensley, Mr. William Forder investigated the systemic effects of repeated intraperitoneal injections of small quantities of colchicine in Swiss Albino mice using direct observation of the living iris and the study of microscopic sections of various organs at varying intervals following the injections of colchicine. In the early stages, there appeared to be an increase in the intercellular substance while the number of mast cells remained static or slightly decreased. In the later stages, the number of mast cells was increased and the incidence of tumours was greater. In sections of many of the organs, there was perivascular round-cell infiltration together with an increase in the number of plasma cells suggesting an autoimmune reaction.

Professor J. W. A. Duckworth has continued his research into the development and post-natal changes in the specialized conducting tissue of the human heart. The studies have demonstrated that this tissue does not reach its final development until six months after birth, and also that the most striking changes occur during the immediate post-natal period.

Investigations are also proceeding on the specialized conducting tissue of the hamster heart, firstly to determine the normal appearance of this tissue throughout its development and secondly to try to determine whether the tumours, which develop in the hearts of neonatal hamsters following injection with polyoma virus are arising in the specialized conducting tissue during the time when rapid changes are taking place in these cells immediately after birth.

During the past year, Dr. Michael C. Hall has continued his studies on the experimental production of degenerative arthritis. He has shown that (*a*) changes typical of those that occur in the human can be produced in the rat by the relief of cartilage contact and transmission of force through the cartilage; (*b*) following division of the sciatic nerve in the rat, there are no articular changes for as long as six months. Thereafter, there is a progressive thickening and proliferation of the synovial lining of the joint, similar to that seen in human neuropathic arthritis.

He has carried out further studies on the significance of the protein element of intercellular substances in the retention of water. The denaturation of collagen by protein is found to affect both water uptake and loss in rats' skin in vitro, and it is

believed the protein as well as the mucopolysaccharide must be considered in the role of water retention.

In addition, he has also examined the cadaveric material of the Department in order to determine the geographic distribution of degenerative changes in the joints of the hip, knee and first metatarso-phalangeal regions. In the hip a high incidence of degenerative changes was found in the non-pressure bearing areas; in the knee degenerative changes were found in 100 per cent of the patellae, and the sites of changes in the surfaces of the knee were found to be identical from side to side; degenerative changes in the great toe were commonly in the areas lacking cartilage contact.

The pre- and post-natal development of Luschka's joint in the cervical spine has been studied. It is found that this joint develops by lateral fissuring in the intervertebral disc in the young child, but that it is not present at birth. The fissuring occurs prior to the degeneration of the disc, in the sense that degeneration is usually understood. Such joints are found in other primates and in the rat. They have been related to the possession of an uncinat process, which is found in all primates, and in many marsupials and rodents, but not in the herbivores or ungulates.

Microradiographic examination of osteoporotic human material is continued. This has suggested that osteoporosis involves the total reworking of a bone, and not just a part of it. A survey of all the major bones in one body, involving several thousand microradiographics is in progress, with the intention of establishing patterns of similarity.

A radiographic survey of the architectural structure of all the bones of the body, with the exception of the skull, during development and in adult life, has been nearly completed, and will be published as an atlas.

Bibliographic research to establish a ready reference to the present sources of information on functional histology and anatomy of the locomotor system has been completed and is in process of publication.

Dr. D. L. McLeod and Dr. A. W. Ham have this year completed a study to show the possible oncogenic effects in newborn hamsters of some of the common communicable disease viruses of man.

Of all the viruses tested only the Adenoviruses type 12 and type 18 which were previously reported by Trentin and Huebner to produce tumours in newborn hamsters, showed positive results.

Animals injected during the first few days of life show a high incidence of tumours, whereas older animals do not. Why newborn animals should be more susceptible to the oncogenic effect of the virus remains unexplained.

However, two theories which have been advanced to explain this increase in susceptibility to the oncogenic effects of virus during the newborn period are; firstly that during this period it may be possible to induce a state of immune tolerance in these young animals so that they are unable to develop a good immune response to the virus and possibly to the tumour, and secondly, that at this stage in their development many of the organs of the newborn animals have not completed their development and therefore many of the cells present are still in an undifferentiated state, and may therefore be much more susceptible to the tumourigenic effect of the virus. Several experiments designed to prove or disprove these two theories have been undertaken, and results are now pending.

In conjunction with Mrs. June Almeida several attempts to demonstrate the presence of an infectious agent from tissues from cases of myeloid leukaemia and from two cases of infectious mononucleosis have been made by injection of homogenates of tissues from these cases into animals and into tissue cultures, and by examination of the tissues and cultures by electron microscopy.

Dr. C. G. Smith has been investigating the distribution of the branches of the posterior cerebral artery that supply the visual area.

Dr. J. S. Thompson has been carrying out, during the past year, a research on the transplantation of whole mammary glands of mice of various inbred strains into

the F1 hybrids of these strains. The effect of normal maturation, pregnancy, lactation, and prolonged estrogen therapy upon these glands was studied. These glands have lactated and have been suckled. They have developed hyperplastic nodules and tumours. It would appear that these glands develop and form tumours by their own timetable rather than by that of the host. Mammary glands from male mice have been successfully transplanted into female mice made tolerant to male tissue by neonatal injections of male spleen cells. These glands respond to the stimulus of the female environment by enlarging and to the stimulus of lactation in the host by appearing to undergo changes similar to those in a lactating female gland. The National Cancer Institute of Canada is currently supporting this work.

PUBLICATIONS

- HALL, M. C. "Alteration of the Bone in Early Osteoporosis" (*Proceedings of Canadian Federation of Biological Societies*, vol. 6, 1963, p. 27).
- "Complications at the Ankle and Mid-tarsal Joints Following Subtalar Arthrodesis by the Gallie Method" (*Clinical Orthopaedics*, vol. 28, 1963, pp. 207-9).
- "Fractures" (*Canadian Medical Association Journal*, vol. 89, no. 6, Aug. 10, 1963, pp. 255-61).
- "Locomotion and Gait" (*Journal of Canadian Physiotherapists Association*, vol. 15, no. 3, Sept., 1963, pp. 143-54).
- "Research in Osteoarthritis" (*Canadian Arthritis Research Scope*, vol. 4, 1963, pp. 2-6).
- HALL, M. C., *et al.* "The Resistance to Dehydration of Full Thickness Rats' Pelt in Relation to Body Weight and Atmospheric Temperature" (*Gerontologia*, vol. 7, no. 3, 1963, pp. 181-6).
- MCLEOD, D. L. and HAM, A. W. "Search for Oncogenic Properties in Various Viruses Found in Man: Positive Results with Adenovirus Types 12 and 18" (*Canadian Medical Association Journal*, vol. 89, no. 16, Oct. 19, 1963, pp. 799-805).
- THOMPSON, J. S. "Transplantation of Whole Mammary Glands in Mice" (*Transplantation*, vol. 1, Oct., 1963, pp. 526-34).

ART AS APPLIED TO MEDICINE

Under the direction of Professor N. Joy

Work requests for 1963-64 were more than double the number for 1962-63. Approximately 350 graphs, movie titles, and 175 drawings, as well as pictures for half a dozen movies, and several small displays were prepared. However, considerably less than a quarter of the papers published during this period by members of the Faculty of Medicine were illustrated by our Department.

In September, Miss E. Blackstock, Miss N. Joy, and Dr. A. M. Rappaport visited the National Film Board to seek advice on animation for several of Dr. Rappaport's movies, which constituted Miss Blackstock's major work for the next few months. In May, Miss Blackstock, Miss Joy, and one student visited Crawley Films in Ottawa and were given a great deal of very valuable information and demonstrations. Mr. Bob Gilder, photographer for the Princess Margaret Hospital, has given continuous help and advice throughout the year on our animation problems. He goes to England in June to join the staff of Guy's Hospital and to take the final examinations set by the Institute of British Photographers in Medical Photography.

On November 13, 1963, and again on January 20, 1964, the Advisory Committee to the Department met and its recommendations were considered at the November and February meetings of the Council of the Faculty. The recommendation, that a division of Medical Photography be established in the Department of Art as soon as space and funds could be found, was approved. Other recommendations that were approved concerned conditions governing admissions, length of the course, and the suggestion of exploring the possibility of instituting a postgraduate year in Art as Applied to Medicine.

On July 1, 1963, Mrs. Eila Hopper Ross joined the staff of Art as Applied to Medicine as a part-time Assistant Professor. Her primary contribution has been to the teaching programme. She has taken charge of the surgical and dental aspects of the course and has also assisted in the Service Department.

Arrangements were made this year with the Faculty of Architecture for Medical Art students to join drawing classes of the architecture students, and with the Faculty of Dentistry for the students to join the dental anatomy classes. Dr. Sylvia Bensley, Dr. Susan Ritchie, Dr. Harold Baer, and Dr. John Munn have given generous tutorial time to the students.

Mr. Gerald Hodge, senior medical artist of the Faculty of Medicine of Ann Arbor, spent four days in Toronto and conducted a number of symposia for staff and students, and one for the Dean and several members of the Faculty of Dentistry, on art for television, ophthalmological illustration, and studio management. A second visitor, Miss Charlotte Holt, medical sculptor from Chicago, discussed with us our problems regarding three dimensional work. A third visitor, Mr. Tony Gibson, medical photographer for the Children's Hospital, Winnipeg, spent two days advising staff and students on the subject of film animation.

The Department's staff arranged to have an exhibit on Medical Illustration, prepared by the Association of Medical Illustrators, displayed in the Career Guidance Building during the 1963 Canadian National Exhibition. This was later displayed in the Medical Library of the University. The staff also held an open house in February to display students' work and to introduce Mr. Gerald Hodge to friends of the Department.

Three of the Department's staff attended the Association of Medical Illustrators meeting in October, where "Education of the Medical Illustrator" and "Medical Art Problems Relating to Publication," were chief topics.

Mrs. Linda Heller, secretary in the Department for more than three years, terminates her employment for family reasons, on June 30. She will be greatly missed by artists and doctors alike.

PUBLICATIONS

Joy, N. *Art as Applied to Medicine*. Toronto: Department of Art as Applied to Medicine, Faculty of Medicine, University of Toronto. 1963. Pp. 4.

——— "Medical Illustrations and Copyright" (*Medical and Biological Illustration*, vol. 14, no. 2, 1964, 89-95).

BACTERIOLOGY

Under the direction of Professor Philip Greey

The undergraduate teaching was modified during the past year by the use of unannounced term tests. On the whole these were fairly well received by the students and stimulated study early in the fall term.

Effective the first of July last Dr. R. C. French was appointed an Associate Professor to fill the vacancy created by the retirement of Dr. R. M. Price. Dr. French is a biochemist who has had many years experience with antigens, antibodies, bacterial viruses, and polioviruses. He began his association with this University in 1930 and for the past two years has done biochemical studies on the cornea with the Department of Ophthalmology.

Miss Helen M. Boyd, secretary to the department for the past thirty-five years, retired this June. Her pleasant and considerate manner and her scrupulously exact work will be difficult to replace.

RESEARCH

Dr. R. C. French has commenced studies on the phenomenon of "Mutual Exclusion between Bacteriophages." Although this phenomenon was first observed and named in 1942, the mechanisms of exclusion of all kinds are still unknown. The main objective of this work is to obtain some understanding of the biochemical basis for the mechanisms of exclusion. Two systems have been selected for study (a) the exclusion of T 1 by T 4r+ in *E. coli* B, and (b) the exclusion of carried lambda, in the lysogenic strain Y 10 of *E. coli* by T 4r+. Preliminary work on the physiology of these systems is underway as a prerequisite to the biochemical studies.

Dr. G. H. Hawks, at St. Michael's Hospital has continued to determine the sensitivity to penicillin of gonococci and the presence of auto-antibodies in thyroid disease using the tanned red cell technique.

Dr. Marion Ross, at Sunnybrook Hospital, has continued the testing for sterility of materials exposed to sterilizing doses of Cobalt 60. She has found that anaerobic conditions aid the primary isolation of *Streptococcus haemolyticus* from throat and sputum cultures.

Dr. T. E. Roy, at the Hospital for Sick Children, in association with Dr. Norma Temple, has found that the direct demonstration of *Bordetella pertussis* by the fluorescent antibody technique, using secretions obtained from patients by Auger suction, yields more positive diagnoses than routine culture procedures. Modifications of culture medium have improved isolations. With Dr. P. C. Fleming work has continued on cephalosporin C, an antibiotic effective in certain coliform infections, and on the distribution in various bacterial species of an enzyme, cephalosporinase, which destroys the antibacterial activity. Recently it has been found that the semi-synthetic penicillin, cloxacillin, resistant to penicillinase, is an extremely powerful inhibitor of the enzyme cephalosporinase.

Miss Joan Hennessy has continued efforts to grow a virus from specimens of lymph node pus and acute phase sera from patients with cat scratch disease. Extensive passages in primary chick embryo cells produced an agent from approximately half the specimens tested. This agent gave a cytopathogenic effect in other cell lines, principally transformed rabbit lymph node cells, and gave rise to multiple intracytoplasmic bodies not unlike those of the *lympho-granuloma venereum-psittacosis* group. Attempts to neutralize this agent with convalescent cat scratch sera were unsuccessful in tissue culture, by agar gel diffusion, complement fixation and haemagglutination inhibition. A skin test antigen was prepared and tested by Dr. W. B. Spaulding, Department of Medicine, in patients with a previous history of cat scratch disease, with negative results. Further experiments are being carried out to determine the source and nature of this non-specific agent.

Investigation of PPLO in tissue culture cells is being carried out to determine whether freeze storage of cell lines will eliminate the agent, and also to test the comparative virus susceptibility of freshly reconstituted cell lines with those in continuous culture.

In collaboration with Dr. J. M. Finlay, Department of Medicine, bacteriological studies have continued on patients attending the gastro-enterological unit. Studies are in progress on patients undergoing transurethral prostatectomy with the Division of Urology, Toronto General Hospital.

Dr. A. E. Franklin has continued studies on the relationship between tissue culture cells continuously propagated in medium with prednisolone and their sensitivity to selected viruses. Cell lines used in this study included those of malignant origin such as KB, HeLa, Hep-2, and J-111, as well as cells derived from non-malignant tissues such as human amnion, human adult heart, monkey heart, and human embryonic lung. Human amnion cells (FL strain) have been demonstrated to be quite susceptible to all viruses tested, and therefore, have been selected as the most promising cell line for further studies. Viruses previously used have included Poliovirus-1, Coxsackie

A6, A7, A9, A16, Cocksackie B5, B6, ECHO-9 and *herpes simplex*. Studies with these viruses have continued, and in addition, adenoviruses 3 and 4, and the Edmonston strain of measles, have been inoculated to amnion cells continuously propagated in medium with prednisolone, as well as untreated amnion cells. Bacteria-free culture filtrates of *Pseudomonas pyocyaneus* have been prepared and tested for toxicity levels in these cell lines. Experiments are now in progress to determine whether bacterial filtrates will have any influence on adaptation and growth of these viruses in tissue culture.

Dr. J. C. Sinclair and his associates, Miss B. K. Buchner, M.A., and Mrs. L. Shreeve, are continuing their studies of five agents obtained from cases of hepatitis. In this work they are cooperating with Dr. Gerald Bearcroft of the West African Council of Medical Research at Yaba, Lagos, Nigeria, who is studying the effect of injecting the unidentified isolates into patas monkeys.

PUBLICATIONS

COLLINS, A. M. and ROY, T. E. "Transduction of Chloramphenicol and Novobiocin Resistance in Staphylococci" (*Canadian Journal of Microbiology*, vol. 9, Aug., 1963, p. 541).

BIOCHEMISTRY

Under the direction of Professor C. S. Hanes

During the past year 452 students have received instruction in the Department of Biochemistry, the distribution being as follows:

Faculty of Medicine (first medical year)	158
Faculty of Dentistry (first year)	127
Faculty of Arts, third year honour courses	45
fourth year honour courses	9
Graduates Enrolled as Special Students in Faculty of Arts & Science	17
School of Graduate Studies	96
(a) Major Subject Biochemistry	19
Candidates for Ph.D.	10
Candidates for D.Clin.Sci.	1
Candidates for M.A.	8
(b) From other departments	73
(c) Special Students	4
TOTAL	452

Members of the Department have contributed twenty-four lectures and papers at congresses, symposia, and other scientific gatherings during the year. In particular, at the invitation of the Polish Academy of Sciences, Professor C. S. Hanes visited various biochemical institutes and universities in Poland during April; he gave lectures and seminars in Warsaw, Cracow, and Wroclaw. Whilst en route to Poland, he attended the Cinquantenaire de la Société de Chimie Biologique at the Sorbonne in Paris.

RESEARCH

Professors G. E. Connell and G. H. Dixon, with the assistance of Miss D. D. Wood, continued their study of the complete amino acid sequence of the α -chain of human haptoglobin. The results obtained confirmed the hypothesis proposed earlier, viz that the α -chain of type 2-2 haptoglobin contains two regions of identical sequence, both resembling the α -chain of type 1-1 haptoglobin.

In Professor Connell's laboratory, Mr. Murray H. Freedman has continued his investigation of the γ -globulins of normal urine. He has demonstrated the presence in urine of two substances, which consist respectively of single polypeptide chains (identical to the L-chains of plasma γ -globulin) and of pairs of polypeptide chains joined by disulphide bonds. These substances seem to be analogous in structure to the Bence-Jones proteins, which appear in the urine of patients with multiple myeloma. Dr. Ayse Ozge Anwar has continued her work on blood coagulation in cooperation with Professor Connell and with Dr. J. F. Mustard, of the Department of Pathology, focussing her attention on Factor VIII, the antihaemophilic factor. She has been investigating the effect of thrombin in activating Factor VIII. Dr. A. F. Lewis has begun a study of the plasma and urinary proteins characteristic of multiple myeloma. He has obtained several of these pathological proteins in a highly purified state. Mrs. Brenda L. Tattre has been investigating the structure of human haptoglobins of various genetic types with special reference to the disulphide bonds. Dr. A. Szewczuk has undertaken an investigation of the enzyme, γ -glutamyl transpeptidase. He has shown that the enzyme is a sialo-protein, and the removal of the bound sialic acid does not affect the catalytic activity of the enzyme. He has also developed an experimental approach to the structure of the active center of the enzyme.

Professor J. Manery Fisher and Mrs. E. Dryden have tested for insulin activity the separated A and B chains of insulin (kindly prepared by Mr. Peter Aston) using frog muscle as the test system. They have completed studies of the electrolytes of the tissues of adrenalectomized rats, and have established reliable procedures for measuring "extracellular space" in muscle using insulin and sucrose. Mrs. Dryden has collaborated with Mrs. C. Dunkley in a study of muscle deaminase using paper chromatography to separate nucleotides and the Conway Microdiffusion method for the determination of ammonia. In her investigation of phosphate uptake by frog muscle, after brief exposure to P^{32} -labelled phosphate, Mrs. Dunkley has separated and identified four labelled compounds extractable with water; acid extracts contained five P^{32} -labelled compounds, only one of which occurred in the aqueous extract. Miss D. Paterson has separated quantitatively the acid-soluble protein and lipid fractions of muscle and is now studying the appearance of P^{32} -phosphate in these fractions after brief exposures of the muscle to the isotopic compound. Dr. B. Hunt has been successful in separating calcium ions from magnesium ions using the techniques of thin-layer and paper chromatography. She is currently exploring the use of column chromatography for the separation of protein-bound, complexed and ionic calcium and magnesium in serum.

In Professor C. S. Hanes laboratory, Mr. Ross Donovan has continued his studies on pancreatic elastase and has shown that at least two different enzymic components are concerned in the breakdown of elastin. Dr. Rashid Anwar has pursued his studies on the separation and characterization of the peptide fragments which appear during the solubilization of elastin, with a view to defining the specificity of elastases. Dr. Hanes has collaborated further with Dr. J. T. Wong (now at the College of Liberal Arts, Eugene, Oregon) in extending their generalized kinetic theory of enzyme action to include the evaluation of isotopic exchange reactions at equilibrium as criteria of enzymic mechanisms.

Professor R. K. Murray, in collaboration with Professor H. Kalant of the Department of Pharmacology, has continued his studies of the esterase and protein content of certain hepatomas. The so-called "minimal deviation hepatomas" have been found to possess the basic proteins that were missing in the DAB-hepatoma. Certain interesting differences from normal of the esterase content of those hepatomas have been observed and these are under further investigation. In Professor Murray's laboratory, Mr. M. Maung is continuing his studies of the structure and the biosynthesis of the glyco-protein, haptoglobin. He has extensively purified rabbit haptoglobin and measured some of its physical and chemical properties. He has shown that the rise in serum haptoglobin, that occurs in experimental inflammation in

rats, is prevented by actinomycin D, puromycin, or ethionine: hence the observed rise is presumably caused by a net synthesis of protein rather than simply the release of preformed haptoglobin from damaged tissue.

Dr. G. R. Williams, in collaboration with Dr. D. F. Parsons of the Department of Medical Biophysics, has continued studies on the function of the "inner membrane structures" of mitochondrial cristae. The units are demonstrably poor in cytochromes and their exact function remains in doubt. Professor Williams has continued development of the ion chamber system for studying decarboxylations in the Krebs' cycle. In Professor Williams laboratory, Mrs. Jane Tsai has completed her studies of the carboxymethylation of cytochrome c at low pH. The thioether bridges of the haemopeptide are not substituted, the insertion of both carboxymethyl groups being at the methionine residues. The di-substituted haemoprotein is catalytically inactive. Mr. K. A. Davis continued his studies of sulphhydryl compounds and has demonstrated a "product activation" of glutathione reductase in the presence of low concentrations of mercury. Such "de-inhibition" had been the subject of theoretical discussion but this is probably the first experimental demonstration of such an effect. Miss S. Ruedy has begun work on the metabolism of pyruvic acid at low concentrations by rat liver mitochondria.

One graduate student in the Department of Biochemistry completed his work for the Ph.D. degree and presented a thesis as follows: H. Schachter, "The chemical modification of α -chymotrypsin."

PUBLICATIONS

- BISHOP, C. T., COOPER, F. T. and MURRAY, R. K. "Reactions of Carbohydrate Derivatives during Gas-liquid Chromatography" (*Canadian Journal of Chemistry*, vol. 41, no. 9, Sept., 1963, pp. 2245-50).
- CHANCE, B., WILLIAMS, G. R. and HOLLINGER, G. "Inhibition of Electron and Energy Transfer in Mitochondria: III, Spectroscopic and Respiratory Effects of Uncoupling Agents" (*Journal of Biological Chemistry*, vol. 238, no. 1, 1963, pp. 439-44).
- FREEDMAN, M. H. and CONNELL, G. E. "The Characterization of Urinary γ -globulin of Low Molecular Weight" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 7, no. 37, 1964, p. 17).
- "Gamma-globulins of Post-exercise Urine" (*Proceedings Sixth International Congress on Biochemistry* [New York], no. 11-62, 1964, p. 152).
- KALANT, H., MURRAY, R. K. and MONS, W. "Effect of EDTA on Leakage of Proteins from Slices of Normal Rat Liver and DAB-hepatoma" (*Cancer Research*, vol. 24, no. 4, 1964, pp. 570-81).
- MARCUS, G. J. and MANERY, J. F. "Pigeon Muscle Mitochondria: Ion Concentrations, Oxidative Phosphorylation, Swelling and Extra-particulate Space" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 12, Dec., 1963, pp. 2529-42).
- MATHESON, A. T., BJERRE, S. and HANES, C. S. "A Conjugated Form of Aminopeptidase from Autolyzed Extracts of Kidney Tissue" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 8, Aug., 1963, pp. 1741-70).
- MAUNG, M., BAKER, D. G. and MURRAY, R. K. "Studies on Rabbit and Rat Haptoglobin" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 7, no. 39, p. 18).
- MURRAY, R. K., KALANT, H., GUTTMAN, M. and MORRIS, H. P. "Serum, Tumor and Liver Proteins of Rats with Hepatoma 5123 t.c." (*Federation Proceedings*, vol. 23, no. 2, 1964, p. 336).
- SCHACHTER, H. and DIXON, G. H. "A Comparison of Mucoproteins from Normal Meconium and Meconium Ileus Meconium" (*Proceedings Sixth International Congress of Biochemistry*, New York, no. vi-104, 1964, p. 526).
- "Preferential Oxidation of the Methionine near the Active Site of Chymotrypsin" (*Journal of Biological Chemistry*, vol. 239, no. 3, 1964, pp. 813-29).
- SCHACHTER, H., HALLIDAY, K. A. and DIXON, G. H. "An Alteration in the Reactivity of Chymotrypsin and Trypsin towards Hydrogen Peroxide in the Presence of Specific Substrates" (*Journal of Biological Chemistry*, vol. 238, no. 9, 1963, pp. 3134-6; *Proceedings of the Canadian Federation of Biological Societies*, vol. 6, no. 36, 1963, p. 20).
- SZEWCZUK, A. and CONNELL, G. E. "The Effect of Neuraminidase on the Properties of γ -glutamyl Transpeptidase" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 7, no. 37, 1964, p. 17).
- WILLIAMS, G. R. and PARSONS, D. F. "Density Gradient Centrifugation of Sonicated Mitochondrial Fragments" (*Proceedings Sixth International Congress of Biochemistry*, New York, no. viii-111, 1964, p. 670).

COMMITTEE ON ANIMAL CARE

Reported by Dr. Harold Baer

Thirty-five research workers made use in 1963-64 of the facilities of the Committee on Animal Care. Animals housed included dogs, cats, guinea pigs, rabbits, rats, mice, pigeons, hamsters, pigs, groundhogs, and monkeys. There were 370 operations performed in the animal operating rooms, the majority being sterile procedures.

Diseases and parasitic conditions diagnosed were: (a) dogs—hepatitis, bronchitis, bronchopneumonia, and endo- and ectoparasites; (b) cats—feline distemper, pneumonitis, idiopathic gastritis, rhinitis, and endoparasites; (c) rabbits—pasteurellosis, coccidiosis, mucoid enteritis, ear mites, and otitis; (d) guinea pigs—idiopathic bronchopneumonia, streptococcal lymphadenitis, and streptococcal pneumonia; (e) mice—mite infestation.

Since a greater proportion of researchers are now keeping animals on a long-term basis, enlargement of the holding facilities and isolation quarters is urgently needed, especially considering the infections diagnosed in the past year.

Improvements in the facilities include: completion of a ventilation system and fluorescent lighting in the large dog room; additional caging for cats, rats, and rabbits; installation of a new air conditioner in the rabbit room; and purchase of additional equipment for the animal operating rooms.

Advice concerning laboratory animals was given to the Toronto Psychiatric Hospital, Ontario Cancer Institute, the Department of Anatomy, and the Faculty of Food Sciences.

A series of surgical demonstrations and lectures were given by Dr. Baer to second year Art as Applied to Medicine students.

Two business meetings of the Committee on Animal Care were held during the fiscal year.

MEDICAL BIOPHYSICS

Under the direction of Professor H. E. Johns

During part of the present year and part of next year Dr. J. R. Cunningham will be on leave of absence in Colombo, Ceylon as a Radiation Physicist for the International Atomic Energy Agency. Professor J. E. Till was a Visiting Professor for one week at Rehovoth, Israel, where he gave lectures on the "Cellular and Molecular Aspects of Radiobiology" in a course sponsored by the International Atomic Energy Agency. He was also a Visiting Professor for one week at New Mexico Highlands University where he gave a course of lectures on the "Radiobiology of Mammalian Cells." Professor G. F. Whitmore was a Visiting Professor at the Penrose Hospital, Colorado Springs where he gave ten lectures on the "Radiobiology of Mammalian Cells." Professor H. E. Johns attended a one week meeting of the International Committee on Radiological units in Rome, Italy and Oxford, England.

Undergraduate teaching. Professor Johns gave one-third of the course in Physics given to premedical students. Professor Till gave Physics 18 to physiology and biochemistry students. Professor Ham instructed in many of the laboratory classes in the histology course given to first-year medical students and assisted in the teaching of this course. Professor McCulloch was in charge of the course in clinical microscopy given second-year medical students. Professor Siminovitch with Dr. Sheinin assisted with the lectures and labs in Microbiology given in the Microbiology Department.

Graduate teaching. Last year 27 students were enrolled in the Department doing graduate work towards the M.A. and Ph.D. degrees. Six postdoctoral fellows pursued research studies in the Department.

Postgraduate teaching. Professors McCulloch, Axelrad, Siminovitch, and

Cinader gave lectures in the advanced graduate course given by the Division of Postgraduate Medical Education. Dr. Wright gave lectures in the Diploma Course in Radiology and to the therapy and diagnostic technicians. Professors Siminovitch, McCulloch, Bruce, and Axelrad gave lectures in the Postgraduate Medical Education Course, Haematology and Neoplastic Diseases Division.

Members of the staff delivered lectures and/or papers as follows: Mrs. J. D. ALMEIDA of Professor Howatson's group on "The Presence of Groups of Oncogenic Viruses in a Classification Based on Morphology," the Clinical Research Society, Toronto; on "Morphological Classification of Viruses," the Biology Club, University of Toronto; on "The Grouping of Oncogenic Viruses in a Classification Based on Morphology," the Biology Club, Queen's University; on "The Anatomy of Viruses," the Department of Anatomy, University of Toronto; Dr. ASPIN with Dr. A. SASS-KORTSACK on "Radiocopper Studies in Patients with Wilson's Disease and in Control Humans," the Society of Nuclear Medicine, Toronto; with Dr. T. H. HOLMES on "Tracer Studies of the Intercompartmental Transfer Rates of Copper in the Rat," the Medical Physics Division of the Canadian Association of Physics, Dalhousie. Professor AXELRAD on "Review of Cancer Research," the British Columbia Cancer Institute, Vancouver; on "Proliferative Behaviour of Cells from Spontaneous AKR and Gross Virus-Induced C₃H Lymphomas," the American Association for Cancer Research Meeting, Chicago. Professor BRUCE on "The Dissemination and Growth of Transplanted Isologous Murine Lymphoma Cells Using the Spleen Colony Method," the American Association for Cancer Research Meeting, Chicago. Professor BRUCE with D. MOUNT on "The Use of Iodine-125 for Determination of Transfer Rates of Proteins," the Society of Nuclear Medicine, Chicago. Dr. R. S. BUSH with Professor BRUCE on "Radiation Sensitivities of Lymphoma Cells as Determined by Two Different Assay Methods," the Radiation Research Society Meeting, Miami.

Professor B. CINADER on "Mechanism of Enzyme-Inhibition by Antibody," University College, London, England; on "The Structure of Antigen-Antibody Complexes: A Study by Electron Microscopy," the French Society of Microbiologists, Institut Pasteur, Paris; on "Enzyme-Antibody," Walter Reed Army Institute for Research, Washington; on "Immunology of Enzymes," the Biochemistry Department, University of Western Ontario; on "Studies on a Mouse Antigen, Mouse Complement, and the Role of Complement in Immune Damage," Western Reserve University, Cleveland; on "Antienzymes," the Department of Experimental Pathology, Western Reserve University, Cleveland; on "Studies on a Mouse Antigen," the Ontario Antibody Club, Toronto, Ontario; on "Studies on Inbred Complement Deficient Mice," Symposium on Immunology and Cancer, British Society for Immunology, London, England. Professor FUERST on "Virus Control Mechanisms as Studied with Defective Bacteriophage," the Sixth Canadian Cancer Research Conference, Honey Harbour, Ontario. Dr. J. H. FOWLER of Professor Siminovitch's group on "An *In Vitro* Study of Erythroid Differentiation in Spleen Colonies," the Federation Meetings, Chicago. Professor HAM on "Changing Concepts about the Relation of Virus to Neoplasia," the Life Insurance Officers Association of America, Hot Springs, Virginia. J. S. HASKILL with Professor HUNT on "Hidden Molecular Damage Produced by γ -Irradiation in Crystalline Ribonuclease," the Radiation Research Society Meeting, Miami Beach, Florida.

Professor A. F. HOWATSON on "Viruses: Their Chemical Nature and Ultrastructure," the U.I.C.C. Cancer Conference, Amsterdam, Holland; on "Electron Microscope Studies on Viral Skin Lesions," the Department of Dermatology, Wayne State University, Detroit; on "The Contribution of Electron Microscope to the Study of Virus Structure," the Michigan Electron Microscopy Forum, Detroit; on "Observations and Impressions from the European Laboratories," the Burton Society of Electron Microscopists, Kingston, Ontario; on "The Fine Structures of Viruses," the Department of Anatomy, McGill University, Montreal; two lectures on "The Structure of Viruses," the Virology Course, Seton Hall College of Medicine and Dentistry, Jersey City, N.J.; on "Electron Microscopy of Viruses—Structure and

Symmetry at the Threshold of Life," the Royal Canadian Institute, Toronto, Ontario; on "The Picodna Viruses," the Ontario Society of Pathologists, Toronto, Ontario; and on "The Anatomy of Viruses," the Canadian Federation of Biological Societies, Halifax, N.S. Professor HUNT on "Electron Spin Resonance and Biological Effect," the University of Pennsylvania. Professor HUNT with A. B. ROBINS on "Influence of Metallic Complexes on the Free Radical Yields in Dry Enzymes," the Biophysical Society Meeting, Chicago.

Professor JOHNS on "The Ultraviolet Photochemistry of the Dinucleotides of Uracil and Thymine," the Canadian Photobiology Conference, Carleton University, Ottawa; on "U.V. Effects on Biological Systems, Especially on Nucleic Acids" and "Practical Problems Related to Dosimetry in Radiation Therapy," the Kansas Medical Center; on "The U.V. Photochemistry of Nucleic Acid Components," the Argonne Laboratory, Illinois; with M. L. Pearson and C. W. Helleiner on "U.V. Photochemistry of TpT," the Biophysical Society Meeting, Chicago; with M. L. Pearson, C. W. Helleiner, and D. Logan on "The Effects of Ultraviolet Light on Thymine, Uracil, and their Derivatives," the Eighteenth Annual Symposium on Fundamental Cancer Research, M. D. Anderson Hospital, Houston. Dr. J. C. KENNEDY of Professor McCulloch's group on "Gamma-Ray Survival Curves for Capacity of Mice to Produce Haemolytic Plaque-Forming Cells," the Federation Meetings, Chicago. Professor McCULLOCH with Professors TILL and SIMINOVITCH on "Studies of the Control of Haemopoiesis Using the Spleen-Colony Method," Sixth Canadian Cancer Research Conference, Honey Harbour, Ontario.

Professor PARSONS on "Recent Advances in the Study of the Fine Structure of Mitochondria," the McArdle Cancer Institute; on "An Investigation of Point Cathodes for the Electron Microscope," Burton Society for Electron Microscopy; on "Negative Staining of Mitochondria," the University of Pennsylvania, Rosewell Park, and Columbia University; on "The Possibilities for Phase Contrast Electron Microscopy," the Burton Society for Electron Microscopy, Kingston; on "Recent Advances in the Study of Mitochondrial Fine Structure," the McGill General Hospital Research Institute, Montreal; on "The Relation of Fine Structure to Function in Animal Cell Mitochondria," at The Public Health Research Institute, New York; on "Fine Structure of Mitochondria of Plants and Animals and of Plastids," Canadian Society of Plant Physiologists, Kingston. Dr. R. SHEININ of Professor Siminovitch's group on "Recent Biochemical Studies on Polyoma Infection of Mouse Embryo Cells," Biochemical Virology of Animal Viruses Meeting, Split Rock, Connecticut and the Biochemistry Department, University of Alberta, Edmonton. Professor SIMINOVITCH on "Proliferation and Differentiation of Haematopoietic Stem Cells," St. Jude's Hospital, Memphis, Tennessee; Biology Section, National Research Council, Ottawa; Research Laboratory, Montreal Cancer Institute, Montreal; Western Reserve University, Cleveland.

Dr. TSIEN, Dr. CUNNINGHAM, and Dr. WRIGHT on "Comparative Studies on Dose Distributions of Cobalt 60 Full and Arc Planar Rotation," the Radiological Society of North America. Professor TILL on "Proliferation and Differentiation of Haemopoietic Stem Cells," the Institute for Cancer Research, Philadelphia. With Professors McCULLOCH and SIMINOVITCH on "The Relationship between Haemopoietic Colony-forming Cells and Survival of Mice Following Total-body Irradiation," the Radiation Research Society, Miami, Florida; on "Relationship between Haemopoietic Colony-forming Cells and Survival of Mice Following Total-body Radiation," the Experimental Radiopathology Research Unit, Hammersmith Hospital, London, England. Professor WHITMORE on "Radiation Induced Mitotic Delay in Mammalian Cells," the Biology Division, Oak Ridge; on "The Radiobiology of Mammalian Cells," the Radiological Society of North America, Chicago; on "Recovery Phenomena in the Symposium of Cellular Radiation Biology," the M. D. Anderson Hospital, Houston. Dr. WRIGHT, Dr. CUNNINGHAM, and D. BELLINGER on "A New Method for Making Air Gap Compensating Filters and Wedges," the Radiological Society of North America.

RESEARCH

The research work of the Department entailed a great deal of collaboration between various members of the staff along the following lines: (1) Molecular Radiation Biology (2) Structure of Viruses and Subcellular Particles (3) Studies on Viruses (4) Effects of Radiation on Mammalian Cells (5) Studies on Blood Forming Cells (6) Immunological Studies (7) Clinical Physics Applied to Radio-diagnosis and Radiotherapy.

Molecular Radiation Biology

Professor Hunt has continued to study the initial processes by which the energy from ionizing radiation induces changes within organic molecules. In crystalline samples of ribonuclease the stable free radicals produced by the irradiation have been related to the loss in its chemical activity. Recent collaborative work with Dr. B. Robins, of the Chester Beatty Institute, London, has shown that complexes between metallic ions and ribonuclease markedly protect the enzyme against inactivation. A close correlation has been obtained between the extent of this protection and the reduction in the number of stable free radicals produced in this protein. With Mr. Haskill, a sensitive chemical test for damage in ribonuclease has been devised which measures the ability of the molecules to refold following irradiation. By the use of this technique it has been shown that many molecules which are still chemically active contain hidden sites of damage. Chromatographic separations of the damaged molecules indicate that many of the damaged molecules polymerize through disulphide interchange.

Professor Hunt, working with Mr. Leung, has been studying the nature of the free radical intermediates produced by ionizing radiation in simple organic systems in order to ascertain the initial sites of chemical change. The Van de Graaff generator has been converted so that liquid samples can be bombarded with a beam of 2.5 MeV electrons. The free radicals produced in the samples will be observed on our electron spin resonance spectrometer. Using this technique, it is hoped that it will be possible to observe and identify transient free radicals which have lifetimes as short as ten microseconds.

Professor Johns, working with Professor Helleiner of Dalhousie and Mr. M. L. Pearson, has determined the number and kind of photoproducts produced when dinucleotides of thymine and uracil are irradiated in solution with monochromatic ultra violet radiation. In thymine at least two dimers are produced which can be separated chromatographically. The formation and reversal of these dimers to monomers depends upon the wavelength. In addition, two other types of photoproducts can be produced which behave as dimers since they can be converted one to the other by radiation. In uracil there is also produced a hydrate and other photoproducts in smaller yield. These are being investigated and related to the photoproducts produced in poly U and in irradiated bacteria and mammalian cells. Professor Whitmore, working with Mr. Logan, is studying the effect of U.V. on the ability of poly U to act as a template in the synthesis of amino acids using the Nirenberg and Ochoa method. It is hoped that these studies will elucidate the exact molecular nature of ultra violet lesions and the effect of such lesions on self-replicating systems.

Professor Johns and Mr. C. Cavilla have studied the effects of U.V. of various wavelengths on the plaque forming ability of the bacterial viruses T2, T4, and T6. They have shown that T4 is increasingly more resistant to long wavelength radiation than T2 and T6. This can be explained by the action of the *v* gene present in T4 which repairs a larger and larger percentage of the ultra violet lesions. The molecular nature of the lesions involved is being sought.

Dr. A. M. Rauth, working with Professors Johns and Whitmore, has investigated the ultra violet radiobiology of a number of bacterial and animal viruses containing either DNA or RNA. He has found that the action spectrum of these viruses depends

upon whether their nucleic acid is single or double stranded. Viruses which contain double stranded nucleic acid appear to be ten times more resistant per unit mass of nucleic acid than those which contain single stranded nucleic acid. In addition there is a difference in the variation of sensitivity with wavelength in that the viruses containing single stranded nucleic acid are relatively more sensitive to ultra violet light at 225 m μ than at longer wavelengths. In some of the viruses studied the protein coat complicated the interpretation of the ultra violet radiobiology.

Structure of Viruses and Subcellular Particles

Dr. W. C. Russell, working in collaboration with Professor Howatson, has attempted to confirm the findings of Dr. Pam Abel of Cologne who reported the successful cultivation of an animal virus, vaccinia, in bacterial cells, and further, to demonstrate the growth of two other animal viruses, *herpes simplex* and polyoma, in such a system. Arising from this investigation, new and interesting observations have been made on the surface structure of the bacillus, and on several different types of bacteriophages associated with it.

During experiments involving the serial passage of liver cells in heavily irradiated mice, Professor McCulloch obtained histological evidence for the presence of a virus in the passaged cells. The virus was shown by electron microscopy to resemble the herpes viruses, and is probably mouse cytomegalic virus. The virus, which can be propagated on mouse embryo cells *in vitro*, is of interest because of its possible association with cell transformation. Studies of its fine structure and of its developmental cycle are being pursued.

Mrs. Almeida, working in collaboration with Dr. Ditchfield of Ontario Veterinary College, has examined coccal virus and has shown that it is morphologically identical to vesicular stomatitis virus.

Professor Parsons has studied the projecting subunits on the membranes of mitochondria. When prepared by negative staining, the subunits have been observed by electron microscopy in a wide variety of animal, plant, and insect mitochondria. They have also been seen in plant proplastids and chloroplasts. The relation of the subunits to mitochondrial cytochromes has been examined in joint work with Professor G. W. Williams (Department of Biochemistry) and with Professor Britton Chance (University of Pennsylvania). Low temperature double beam spectrophotometry has indicated no loss of mitochondrial cytochromes when the subunits are removed by sonication. In addition, subunits of usual shape have been found in certain tissues which lack one or more cytochromes. It has been concluded that the subunits contain little or none of the mitochondrial cytochromes.

In collaboration with Professor E. Racker (New York University), it has been found that treatments that remove subunits, also abolish oxidative phosphorylation. One of two soluble protein preparations required to restore oxidative phosphorylation appears to contain purified subunits. Incubation of proteins with inactive stripped mitochondrial membranes produces recombination of subunits and partial restoration of oxidative phosphorylation. It has been concluded that the subunits contain an essential part of the oxidative phosphorylation enzyme complex. Professor Parsons has continued attempts to use electron diffraction for the structural analysis of biological materials. The first stage of an analysis of thin films of poly γ -benzyl L-glutamate has been completed. An α -helix configuration was found which agreed closely with the Pauling and Corey model. Further work is aimed at electron diffraction analysis of films of DNA and of single layers of cell membranes.

Studies on Viruses

Professor Siminovitch, working with Dr. Kajioka, completed his studies on the effects of inhibitors on development of vaccinia virus in Earle's L cells. Various stages of development could be delineated by combining electron microscopic, autoradio-

graphic, and infectivity techniques with various specific inhibitors of vaccinia virus multiplication.

Professors Siminovitch and Fuerst are examining the process of γ -phage development in *E. coli*. Various mutations in the genome of this phage can be obtained which result in inhibition of virus multiplication in different ways. Mutations of two types are being isolated: so-called "defective" mutants, in which the mutated gene is carried in the prophage, and temperature sensitive mutants, in which the mutants can grow at low, but not at high temperatures.

Mr. Mount, working with Professor Fuerst, has characterized a number of defective mutants by their physiological defect and Professor Fuerst has characterized a number of the same mutants genetically. Mr. Eisen, working with Professor Siminovitch, is examining the ability of defective mutants to synthesize virus DNA. Mr. Harris and Dr. Rosenberg working with Professors Siminovitch and Fuerst are isolating a number of temperature sensitive mutants. These are also being characterized both genetically and physiologically.

Dr. Sheinin, in Professor Fuerst's group, has developed new methods for the extensive purification of polyoma virus, and using these methods, has shown that the DNA of polyoma virus is synthesized *de novo* from medium constituents. Dr. Sheinin is now examining the interaction of polyoma virus and its host cells with a mutant of polyoma which allows infection of 100 per cent of the host cells.

Dr. McLeod and Dr. Ham continued their studies on the induction of tumours in hamsters by means of adeno virus types 12 and 18. Mr. J. F. Williams and Professor J. E. Till have studied the morphological transformation of rat embryo cells following infection *in vitro* with polyoma virus. A reliable method for the measurement of the frequency of transformation has been developed, and has been applied to a study of some of the factors known to affect the transformation frequency.

A notable technical advance during the past year is the development of a precise, rapid assay for the Friend virus by Professor Axelrad and Dr. R. A. Steeves. This now permits quantitative virological studies to be made on a mammalian leukaemia.

Effects of Radiation on Mammalian Cells

Professor Whitmore has continued his studies on the effects of radiation administered at various times in the life cycle of mammalian cells grown and irradiated *in vitro*. These studies have demonstrated that there are pronounced changes in the radiation response of cells during their life cycle and especially during the period when DNA synthesis is occurring. These changes in sensitivity also have pronounced bearing on the nature of the radiation response of such cells to fractionated doses of radiation, and in part account for the recovery phenomena which are apparent between such dose fractions. In addition to these effects there is, however, a demonstrable repair of sublethal radiation damage within mammalian cells and the nature of this repair process is also being investigated.

Working with Mr. Pujara, Dr. Whitmore has continued studies on the effect of bromodeoxyuridine on the growth and radiation response of mammalian cells. These studies have indicated that the drug does have a pronounced toxicity which reduces the apparent growth rate of the cells because it reduces the division probability. It does not appear however to have any pronounced effect on the duration of the cell cycle. These toxic effects may in large part explain the apparent radiation sensitization produced by the drug.

Dr. N. Bruchovsky and Professor J. E. Till have examined the effect of phenethyl alcohol on the DNA synthesis cycle of L-strain mouse cells in culture. This compound is known to inhibit DNA synthesis in micro-organisms, and has been found to have a similar effect on mammalian cells. It has also been shown that the irreversible changes induced in the DNA synthesis cycle of mammalian cells by phenethyl alcohol are much less extensive than those observed for other inhibitors, in that the inhibitory effects of phenethyl alcohol are almost fully reversible even after exposure of cells to the inhibitor for periods longer than a week.

Studies on Blood Forming Cells

During the past year, investigations by Professors McCulloch, Till, and Siminovitch of differentiation within the haemopoietic tissues of mice have continued. The programme has centred upon the exploitation of the spleen-colony method, which was developed by Professors Till and McCulloch, and which permits the study of differentiation occurring *in vivo* in populations of cells each descended from a single progenitor cell. On the basis of analysis of a large number of spleen colonies, a stochastic model for the behaviour of spleen colony-forming cells has been proposed. It is suggested that spleen colony-forming cells may either replicate, producing two cells with colony-forming capacity, or may differentiate, and, in so-doing, lose the ability to form colonies; it is suggested that the choice between these two alternate fates is made at random governed only by definite probabilities.

The spleen colony technique has been used to study the features of mice with specific mutations known to affect blood formation. Mutations of the W series and the Steel series have been studied. It has been found that the genetic defect in mice of genotype WW^v affects colony-forming cells, while the defect in mice of genotype $S1S1^d$ affects the capacity of mouse tissue to support colony-formation. Thus analysis of these mice has shown the existence of two requirements for normal differentiation, one linked to colony-forming cells and one linked to their environment, but each sufficiently specific to be controlled by a single gene. Analysis of mice bearing other mutations is in progress.

Studies of the properties of colony-forming cells have continued. These cells are considered to be haemopoietic stem cells because they have capacity for differentiation and capacity for self-renewal. However, the latter property, although providing the cells with extensive proliferative capacity, has been shown to be limited, since serial passage of colony-forming cells leads to the loss of colony-forming ability. During experiments in which this loss of proliferative capacity with repeated transfer was being studied for cells derived from fetal liver, two lines of variant cells were recovered. These cells had a higher than normal capacity for colony-formation and did not lose this capacity on repeated passage. A possible relationship between these variant cells and leukaemic cells is under investigation.

With Dr. A. J. Becker's help, studies of the cell-cycle of colony-forming cells have continued. It has been shown that proliferating colony-forming cells can incorporate sufficient radioactive thymidine into DNA to destroy their colony-forming ability. This "suicide" technique permits a measure of the DNA synthetic phase of the cell-cycle. It has been discovered by this method that the majority of colony-forming cells in normal mouse marrow and spleen are in a resting phase rather than moving rapidly through the cell-cycle.

In collaboration with Dr. Fowler, a technique has been developed for the quantitative measurement of erythropoietic activity. The method depends on the incorporation of radioiron into the haeme portion of haemoglobin by cell suspensions *in vitro*. The method has been applied to the study of spleen colonies, and preliminary results suggest that large colonies contain a greater proportion of erythroid elements than small colonies.

In collaboration with Dr. J. C. Kennedy, the study of differentiation has been extended to the immune response. The technique employed is that of Jerne and Nordin, by which individual haemolysis-producing cells can be recognized and measured. The radiosensitivity of the process by which intact animals respond to injection of antigen by the production of antibody-producing cells has been measured, and found to be very similar to the radiosensitivity of the capacity for cellular proliferation. This finding indicates that cell proliferation is an important part of the immune response.

Professor Bruce has continued his study of the colony-forming cells from murine lymphoma. The growth of one line of transplanted cells has been studied in detail and has been shown to multiply with a constant doubling time of 11.2 hours in the spleen, liver, marrow, and blood of recipient animals until the animal dies.

Dr. Bush, working with Professor Bruce, has studied the radiation sensitivity of the cells *in vivo* and *in vitro* to acute doses of radiation and has obtained survival curves for the cells using two different assay systems.

Professor Bruce is now exploring the possibility that differences in the cell cycle of normal and leukaemic colony-forming cells may lead to methods for selectively destroying leukaemic cells.

Immunological Studies

In collaboration with Dr. S. Dubiski, Professor Cinader has discovered an antigen MuBl to be present in the serum of some inbred strains of mice. The synthesis of this antigen is under the control of a single gene. In collaboration with Dr. S. Dubiski and Dr. A. C. Wardlaw, it was shown that whenever the antigen is present the mouse has a functional haemolytic system. Whenever the antigen is missing the haemolytic system is not functional. There is thus a very high degree of correlation between the complement systems and antigen MuBl. Molecules corresponding to mouse antigen MuBl can also be found in the serum of most other mammals including man and guinea pig.

In collaboration with Dr. Ben-Ephraim, Professor Cinader has studied passive cutaneous reactions in MuBl positive, and MuBl negative animals. It has been shown that these reactions consist of two distinct phases, an early phase, which is not dependent on complement, and a later phase, involving cell-fixed antibody, and depending on the presence of complement.

Studies on the interaction between enzyme and antibody were continued using enzyme molecules modified by the attachment of about 10 polypeptide chains. It was found that antibodies directed to such side chains can exercise an inhibitory effect on the enzyme molecule. Consequently it may be concluded that antibodies directed to sites other than the catalytic site can inhibit enzymes. An antibody was discovered which increases rather than inhibits the activity of the enzyme and the relevance of this observation to a concept of antibody-induced configurational changes is being explored.

The breakdown of acquired immunological tolerance by the injection into adult rabbit chemically modified antigens cross reacting with the tolerance-inducing protein, is being studied by Professor Cinader in collaboration with Mr. J. St. Rose and Dr. Yoshimura. It has been shown that the incidence of tolerance breakdown can be correlated with the extent of chemical modifications of the cross reacting antigen.

Professor Axelrad has adapted the spleen colony method for studying the factors at a cellular level which determine whether or not leukaemic cells will grow progressively after transplantation into genetically compatible hosts. The leukaemic process in such animals has been shown to be competitive. On the one hand, its outcome depends on the state of the immune mechanism of the host; "tolerance" to the foreign antigens of leukaemic cells facilitates and "immunity" inhibits leukaemic cell proliferation. On the other hand, the outcome depends on qualities inherent in the leukaemic cells themselves. The cells of virus-induced leukaemias have been shown to be heterogeneous and subject to change with respect to inherited characters affecting their proliferative capacity and their sensitivity to host immunity. Thus, although the majority of cells in the leukaemia population are inhibited by host immunity, a minority often escape and reconstitute the whole population.

Professor Axelrad and his associates have also shown that in mice which develop leukaemia spontaneously both factors favouring progress of the disease are present: the animals have been found to be naturally "tolerant" to the foreign antigen of leukaemic cells, and the leukaemic cells have been shown to possess inherently great proliferative capacity.

Clinical Physics

Professor Baker, working with Mr. J. Scrimger, is continuing the assessment of the scintillation camera. A theoretical investigation to determine the optimum

physical parameters of the system has been undertaken using the I.B.M. computer in the Institute of Computer Science for some phases of the project. The cooperation and interest of Professor Moody of the Institute of Biomedical Electronics has been of assistance in determining design parameters, especially in the development of a ratio circuit which is expected to improve the sensitivity and resolution of the system. Working with Dr. Simpson, use of the body scanner has continued. During the past year a technique has been established to visualize the spleen using heat damaged Cr^{51} tagged red cells. The size, shape, and presence of tumour masses and accessory spleen have been determined. The use of colloidal Au^{198} to visualize functional liver tissue and liver tumours has been found to be superior in many cases to the more routine and accepted practice of using Rose Bengal I^{131} .

Dr. Cunningham and Dr. Wright have now completed their work in connection with the International Atomic Energy Agency and as a result an atlas of dose distributions applicable to many forms of moving field radiation therapy is in press. Dr. Cunningham and Dr. Wright, working with Mr. Bellinger, have developed a device to cut special filters to shape radiation beams to individual patient contours. Mr. Gupta, working with Dr. Cunningham and Professor Johns, has measured scatter functions for large size Co^{60} radiation beams to extend existing data. From this work some important new definitions of certain fundamental quantities have been derived.

Drs. Aspin and Sass-Kortsak are continuing their studies of the uptake and distribution of radioactive copper in patients with Wilson's disease. Within single families they have been able to distinguish between individuals homozygous abnormal for the disease, those heterozygous abnormal, and homozygous normal individuals. This has been achieved by following the levels of Cu^{64} in the liver and the blood.

Dr. Aspin, in cooperation with the Institute of Biomedical Engineering, is completing the transistorized version of the scintillation camera. This instrument will primarily be used at the Hospital for Sick Children to study the transport of Cu^{64} in patients with Wilson's disease.

Dr. Aspin, working with Dr. Holmes, has measured the transfer rate of copper between the various organ compartments of the normal rat. The techniques developed will now be used to study the transfer rates in rats having induced pathological conditions.

PUBLICATIONS

- ALMEIDA, J. D. "A Classification of Virus Particles Based on Morphology" (*Canadian Medical Association Journal*, vol. 89, no. 15, Oct. 15, 1963, pp. 787-98).
- ALMEIDA, J. D., CINANDER, B. and HOWATSON, A. F. "The Structure of Antigen-antibody Complexes: A Study by Electron Microscopy" (*Journal of Experimental Medicine*, vol. 118, no. 3, Sept., 1963, pp. 327-40).
- ALMEIDA, J. D., HASSELBACK, R. C. and HAM, A. W. "Fine Structure of Identical Virus-like Particles in Buffy Coats of Blood from Two Patients with Acute Leukemia" (*Science*, vol. 142, no. 3598, Dec., 1963, pp. 1487-9).
- AXELRAD, A. A. "Changes in Resistance to the Proliferation of Isotransplanted Gross Virus-Induced Lymphoma Cells, as Measured with a Spleen Colony Assay" (*Nature*, vol. 199, no. 4888, July, 1963, pp. 80-3).
- BRUCE, W. R. and ASH, C. L. "Survival of Patients Treated for Cancer of the Breast, Cervix, Lung and Upper Respiratory Tract" (*Radiology*, vol. 81, no. 5, Nov., 1963, pp. 861-70).
- BRUCE, W. R., PEARSON, M. L. and FREEDHOFF, H. S. "The Linear Energy Transfer Distributions Resulting from Primary and Scattered X-rays and Gamma Rays with Primary HVL's from 1.25 mm Cu to 11 mm Pb" (*Radiation Research*, vol. 19, no. 4, Aug., 1963, pp. 606-20).
- BRUCE, W. R. and MEEKER, B. E. "Dissemination and Growth of Transplanted Isologous Murine Lymphoma Cells" (*Journal of the National Cancer Institute*, vol. 32, no. 5, May, 1964, pp. 1145-59).
- BRUCE, W. R. and VAN DER GAGG, H. "A Quantitative Assay for the Number of Murine Lymphoma Cells Capable of Proliferation *in vivo*" (*Nature*, vol. 199, no. 4888, July, 1963, pp. 79-80).
- BUSH, R. S. and BRUCE, W. R. "The Radiation Sensitivity of Transplanted Lymphoma Cells as Determined by the Spleen Colony Method" (*Radiation Research*, vol. 21, no. 4, April, 1964, pp. 612-21).

- CINANDER, B. "Dependence of Antibody Responses on Structure and Polymorphism of Auto-
logous Macromolecules" (*British Medical Bulletin*, vol. 19, no. 3, 1963, pp. 219-24).
- CINANDER, B. and DUBISKI, S. "An Alpha-Globulin Allotype in the Mouse (MuB1)" (*Nature*,
vol. 200, no. 4908, Nov., 1963, p. 781).
- "Effect of Autologous Protein on the Specificity of the Antibody Response: Mouse
and Rabbit Antibody to MuB1" (*ibid.*, vol. 202, no. 4927, April, 1964, pp. 102-3).
- ELKIND, M. M., WHITMORE, G. F. and ALESCIO, T. "Actinomycin D Suppression of Recovery
in X-Irradiation Mammalian Cells" (*Science*, vol. 143, 1964, pp. 1454-7).
- FRIESEN, J. D., SANKOFF, D. and SIMINOVITCH, L. "Radiobiological Studies of Vaccinia
Virus" (*Virology*, vol. 21, no. 3, Nov., 1963, pp. 411-24).
- GOLD, M., PERCY, M. and HELLEINER, C. W. "DNA Polymerase in L Cells: I, Properties of
the Enzyme and its Activity in Synchronized Cell Cultures; II, DNA Polymerase Activity
in Extracts of Cells Treated with X-rays" (*Biochimica & Biophysica Acta*, vol. 80, no. 2,
Feb., 1964, pp. 193-204; 204).
- HAM, A. W. "Changing Concepts about Oncogenic Viruses" (editorial, *Canadian Medical
Association Journal*, vol. 89, Oct., 1963, pp. 824-5).
- HELLEINER, C. W., PEARSON, M. L. and JOHNS, H. E. "The Ultraviolet Photochemistry of
Deoxy-uridylyl (3'-5') deoxyuridine" (*Proceedings of the National Academy of Sciences*,
vol. 50, no. 4, Oct., 1963, pp. 761-7).
- HOWATSON, A. F. and CRAWFORD, L. V. "Direct Counting of the Capsomeres in Polyoma
and Papilloma Viruses" (*Virology*, vol. 21, no. 1, Sept., 1963, pp. 1-6).
- MCCULLOCH, E. A., SIMINOVITCH, L. and TILL, J. E. "Spleen-Colony Formation in Anaemic
Mice of Genotype WW^v" (*Science*, vol. 144, no. 3620, 1964, pp. 844-6).
- PARSONS, D. F. (with Chance, B.). "Cytochrome Function in Relation to Inner Membrane
Structure of Mitochondria" (*Science*, vol. 142, no. 3596, Nov., 1963, pp. 1176-80).
- PARSONS, D. F. and WILLIAMS, G. R. (with Chance, B.). "Cytochrome Content of Mito-
chondria Stripped of Inner Membrane Structure" (*Science*, vol. 143, no. 3602, Jan. 10,
1964, pp. 136-9).
- SIMINOVITCH, L., MCCULLOCH, E. A. and TILL, J. E. "The Distribution of Colony-Forming
Cells among Spleen Colonies" (*Journal of Cellular and Comparative Physiology*, vol. 62,
no. 3, Dec., 1963, pp. 327-36).
- STANNERS, C. P. "Studies on the Transformation of Hamster Embryo Cells in Culture by
Polyoma Virus: II, Selective Techniques for the Detection of Transformed Cells"
(*Virology*, vol. 21, no. 3, Nov., 1963, pp. 464-76).
- STANNERS, C. P., TILL, J. E. and SIMINOVITCH, L. "Studies on the Transformation of Hamster
Embryo Cells in Culture by Polyoma Virus: I, Properties of Transformed and Normal
Cells" (*ibid.*, pp. 448-63).
- TILL, J. E. "Quantitative Aspects of Radiation Lethality at the Cellular Level" (*American
Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 90, no. 5, Nov.,
1963, pp. 917-27).
- TILL, J. E. and MCCULLOCH, E. A. "Repair Processes in Irradiated Mouse Hematopoietic
Tissues" (*Annals of the New York Academy of Science*, vol. 114, Art. 1, 1964, pp. 115-25).
- TILL, J. E., MCCULLOCH, E. A. and SIMINOVITCH, L. "A Stochastic Model of Stem Cell
Proliferation, Based on the Growth of Spleen Colony-Forming Cells" (*Proceedings of the
National Academy of Sciences*, vol. 51, no. 1, Jan., 1964, pp. 29-36).
- WILLIAMS, J. F. and HUNT, J. W. "Molecular Lesions Produced in Ribonuclease by Gamma-
Rays" (*Nature*, vol. 200, no. 4908, Nov., 1963, pp. 779-81).

MEDICINE

Under the direction of Professor K. J. R. Wightman

As the year nears its end, one is bound to reflect somewhat ruefully that the concentration required for each problem tends to preclude the long look ahead. The initiative in planning and building for the future tends to pass to other less pre-occupied persons. The fact that each honorarium, no matter how trifling, requires at least four communications from the departmental office to headquarters in the course of the year, during which time one or more detailed analytic enquiries may be received as to the purpose of the money, is merely one example of the thoughtless proliferation of administrative detail which has been allowed to occur. The Department of Medicine now carries 265 people on its roster (including Fellows, but not Assistant Residents). Its total income is something of the order of \$900,000 from all sources, and it uses seven institutions to provide approximately 500 hours of under-

graduate teaching per year to 450 students. The task of administering all this requires to be simplified.

The Department was saddened by the loss of W. Hurst Brown, Professor Emeritus, who had served long and valiantly in its interest. Dr. D. M. Whitelaw is leaving the Princess Margaret Hospital to accept a professorial post at the University of British Columbia. Dr. Alex Adsett will be leaving to work in Oklahoma and his place will be taken by Dr. Ian Hector in the psychiatric work at the Toronto General Hospital. Dr. Terence Fox is moving to the Scarborough General Hospital and Dr. Vera Price will go to California with her husband Dr. David Price. Dr. Mitchell Kohan will retire from the staff of the New Mount Sinai Hospital. Dr. Kohan has had the rare experience of setting himself a high goal in life and then achieving it through very hard work, devotion, and a unique combination of talents. Dr. Barnet Berris is a worthy successor who takes with him the good wishes of all his associates. These losses are balanced to some extent by the addition of six new teachers to our roster this year. The appointment of no less than twelve has been recommended for the year to come.

Several members of the staff have been offered posts in other medical schools, usually involving a marked advance in academic rank, a higher salary, and much superior facilities to work with. Some of them have decided to stay here in the hope that future developments in Toronto will bring them equivalent opportunities and recognition before too long. Their loyalty is a source of inspiration to us all, but it is a sobering reminder of the responsibility we owe them. Others in this group have not yet made their decision and one feels that the Department is in many ways in a precarious balance which might easily be disrupted. We have been warned for years that invitations of this sort would become more numerous and more attractive as time goes on, and that money, buildings, and academic recognition will be required if we are to hold our men. The thing which has sustained us thus far has been the intellectual and moral climate of the school, and its reputation for soundness. Four years' clamour has produced a disappointingly small increase in the facilities we have to offer, and one is still not certain what can be provided, or how soon.

Nonetheless the greatest danger lies in the factors which are tending to produce a decline in the morale and cohesiveness of the Department. Some of these are identifiable and can be countered; others may come to light only after they have done their damage. In general, they stem from breaks in communication, failure to adhere to normal administrative procedure, and failure to insist on a minimum standard of discipline in the various units. Above all they result from the pursuit of narrow aims on the part of individuals or groups of individuals without regard for the whole welfare of the school.

Despite all this, some very satisfactory accomplishments can be reported. The Department has taken part in an unusually large number of postgraduate courses, as noted in Dr. Macdonald's report. An impressive list of addresses and lectures have been delivered by individual members of the Department in Canadian centres and abroad. The training programme for specialists is still of a very high quality. The undergraduate course is undergoing continuous modifications which seem to be resulting in progressive improvement.

It is difficult to maintain a uniform quality of instructions and supervision of students in such a large number of diverse units, or to co-ordinate their activities closely. Nonetheless the performance of our senior students at examination time has been reassuringly good.

We are grateful to all those in the Department, in all its units, who have devoted so much time and energy to the formulation of plans and proposals for expansion and reorganization in addition to their usual tasks. One can only hope that they will soon enjoy the fruits of all this effort, and find that it has been work well done.

We were pleased to have as visitors to the Department the following: Dr. Barbara Ansell, of London, England, Dr. G. F. Austria, of Quezon City, Philippines, Dr. D. Burkitt, of Uganda, Africa, Prof. E. G. L. Bywaters, of London, England,

Dr. J. V. Dacie, of London, England, Dr. Eloise Giblett, of Seattle, Washington, Dr. Pierre Grabar, of Paris, France, Dr. A. Hodgkinson, of Leeds, England, Dr. D. G. James, of London, England, Dr. P. Mollison, of London, England, Prof. N. D. Purves, of Dunedin, New Zealand, Prof. Sheila Sherlock, of London, England, Dr. A. C. Taquini, of Argentina (Buenos Aires), Dr. C. Wilson, of London, England.

The following is a partial list of the meetings addressed by members of staff. It does not include activities arranged through the Division of Postgraduate Medical Education, which are also very extensive. The total effort in the field of continuing education is impressive. Dr. H. J. M. BARNETT, Pan American Neurological Congress, Peru. Dr. K. W. G. BROWN, Porcupine District Medical Society, Timmins; International Symposium on Anticoagulants, Miami; Symposium on "Structure and Function of Heart Muscle," Toronto. Tri-City Heart Meeting, Buffalo; Michigan State Medical Association, Detroit; Academy of Medicine, Toronto. Dr. K. R. BUTLER, Royal College of Physicians, Quebec. Dr. J. H. CROOKSTON, Ontario Association Clinical Pathologists, Sarnia; Academy of Medicine, Hamilton; Sixth Annual Meeting of the American Society of Haematology, Washington. Dr. J. DIGBY, Ontario Hospital Association Course, Toronto; Canadian Rheumatism Association, Vancouver. Dr. J. R. EVANS, Symposium on "Structure and Function of Heart Muscle," Toronto; Montreal General Hospital; Canadian Cardiovascular Society, Toronto; Canadian Society for Clinical Investigation, Quebec; Federation of American Societies for Experimental Biology and Medicine, Chicago; Society for Paediatric Research; Inter-American Congress of Cardiology, Montreal. Dr. C. EZRIN, Royal College of Physicians, Quebec; International Colloquium, Paris; American Thyroid Association, Rochester; Endocrine Society, San Francisco. Dr. C. C. GRAY, Postgraduate Course, St. John, N.B., Newfoundland Medical Society, Gander; South Peel and Halton County Medical Society, Brampton. Dr. JOAN HARRISON, International Atomic Energy Agency Symposium, Heidelberg, Germany. Dr. F. M. HILL, Royal College of Physicians, Quebec. Dr. J. G. HUMPHREY, International Meeting on Electromyography, Copenhagen, Denmark; Canadian Neurological Society. Dr. J. C. LAIDLAW, International Symposium on Hypertension, St. Adele, Quebec. Dr. S. LENKEI, Canadian Cardiovascular Society, Toronto. Dr. J. A. LITTLE, Royal College of Physicians, Quebec.

Dr. J. F. MUSTARD, World Health Organization, Geneva; Committee on Thrombolytic Agents, St. Louis, Mo.; International Symposium Clotting Factors, Amsterdam; International Committee on Blood Coagulation Factors, Gleneagles, Scotland; National Heart Hospital, London, England; Medical Research Council Atheroma Research Unit, Glasgow, Scotland; Cambridge University, Cambridge; St. Thomas' Hospital, London; Gordon Conference, New Hampshire; Platelet Conference, Brussels, Belgium; Teaching Seminar, McGill University, Montreal; American Heart Association, Los Angeles; Midwest Blood Club, Chicago, Ill.; Ontario Society Biophysics & Biochemistry, Toronto; Fourth Conference on Cerebrovascular Disease, Princeton, N.J.; Anticoagulant Symposium, Miami, Fla.; Canadian Society for Clinical Investigation, Quebec City; Federation of American Societies for Experimental Biology, Section of Experimental Pathology; Seminar, Albany Medical College, Union University, Albany, N.Y.; Inter-American Congress of Cardiology, Montreal.

Dr. M. A. OGRYZLO, Montreal Clinical Society, Montreal; Canadian Association of Medical Technologists, Toronto; Canadian Rheumatism Association, Vancouver; American Rheumatism Association, San Francisco. Dr. J. C. RICHARDSON, Symposium on Parkinson's Disease, Washington, D.C. Dr. H. A. SMYTH, Newfoundland Medical Association, Gander; Canadian Rheumatism Association, Vancouver. Dr. J. VOLPÉ, Royal College of Physicians, Quebec; Canadian Society for Clinical Investigation, Quebec. Dr. J. R. WHERRETT, Queen's University, Kingston. Dr. K. J. R. WIGHTMAN, Lincoln County Academy of Medicine, St. Catharines; College of General Practice, Banff; College of General Practice, Montreal; Conference on Mental Health, Ottawa; Annual Meeting, Ontario Medical Assoc., Toronto; Annual

Meeting, Canadian Arthritis and Rheumatism Society, Toronto; Montreal General Hospital, Montreal; International Congress of Radiology, Montreal.

Dr. E. D. WIGLE, Cardiovascular Surgeons Meeting, Toronto; St. Thomas and Elgin County Medical Society; Canadian Cardiovascular Society, Toronto; American Heart Assoc., Los Angeles; American College of Cardiology, New Orleans; Ciba Foundation Symposium, London, England; Inter-American Congress of Cardiology, Montreal; Queen's University, Kingston; Academy of Medicine, Hamilton. Dr. C. R. WOOLF, Western New York Chest Conference, Lockport, N.Y.; Ontario Thoracic Society, Toronto; South Peel General Hospital, Cooksville; Sudbury District Tuberculosis Association, Sudbury; Queensway General Hospital, Toronto; Academy of Medicine, Toronto; Victoria County Tuberculosis and Health Association, Lindsay; Essex County Tuberculosis Association, Essex; South Cochrane Tuberculosis Association, Timmins; Temiskaming Tuberculosis Association, Haileybury. Dr. E. R. YENDT, Royal College of Physicians, Quebec; Union Memorial Hospital, Baltimore; State University of New York, Buffalo.

RESEARCH

Research activities are increasing at all the hospitals. Space will allow only a very brief reference to some of the projects which are under way. The Blood and Vascular Disease Research Unit continues to be a most useful addition to our facilities. Clinical investigation wards are in operation at the three major teaching hospitals, and at the Princess Margaret Hospital.

Allergy-Immunology

Dr. S. Dubiski at Toronto Western Hospital. The study of globulin allotypes in rabbits and rodents. Dr. I. Broder at Toronto Western Hospital. Studies of the mechanism of anaphylaxis and serum sickness—reaction to soluble antigen antibody complexes, etc. Dr. J. Crookston at Toronto General Hospital (with Mrs. Crookston). Studies of auto-immune haemolytic anaemia—specificity of cold agglutinins and Donath-Landsteiner antibody; antiskeletal muscle antibodies in the serum of myasthenia gravis. Dr. D. M. Whitelaw at Princess Margaret Hospital (with Dr. Cinader). Immuno-therapy of cancer of the cervix. Drs. M. W. Johnston, R. Volpé, and C. Ezrin at Toronto General Hospital. Incidence of thyroid auto-antibodies in patients with auto-immune disease. Dr. J. D. L. Fitzgerald at Toronto Western Hospital and Dr. C. R. Woolf at Toronto General Hospital. Both are continuing a study of the effect of unilateral glomectomy in patients with intractable asthma.

Cardiovascular

Drs. K. W. G. Brown and R. L. MacMillan at Toronto General Hospital. Studies of causes of mortality in acute myocardial infarction, operation of a special coronary unit; study of the effect of heparin in acute coronary thrombosis. Drs. K. W. G. Brown and J. Morrow. Appraisal of electric countershock in cardiac arrhythmias. Dr. J. R. Evans at Toronto General Hospital (with Dr. Murray Jacobs). Metabolism of fatty acid and carbohydrate in an isolated beating heart preparation. Dr. J. R. Evans at Toronto General Hospital (with Dr. Charles Hollenberg, Montreal). Effects of experimental diabetes on fatty acid metabolism of heart muscle. Dr. J. R. Evans at Toronto General Hospital. Development of a method of surface scanning of the heart with a radioactive substance; long-term study of children with aortic stenosis and ventricular septal defect in adult life.

Dr. A. J. Kerwin at Toronto Western Hospital (with Dr. D. R. Wilson, Department of Surgery). Valve replacement in aortic and mitral valve disease; haemodynamic studies of extracorporeal circulation as related to blood sequestration; assessment of the screening test for hypertension secondary to renal artery lesion. Dr. J. C. Laidlaw at Toronto General Hospital (with Dr. Guy Emery). Role of adrenal mineralocorticoids in hypertension; Study of patient with primary aldosteronism due to unilateral

adrenal hyperplasia; secretion rate of aldosterone in benign essential hypertension; investigation of a synthetic heparin-like compound which is an inhibitor of aldosterone secretion.

Dr. S. Lenkei at Toronto Western Hospital. The pathophysiology of anoxaemia in patients with spontaneous and measured hypoxia, extracorporeal circulation and hypothermia; potassium shifts during extracorporeal circulation; Dr. J. Alick Little at St. Michael's Hospital and Sunnybrook Hospital (with Dr. H. M. Shanoff). Study of serum lipids in coronary heart disease. Dr. R. L. MacMillan (John Oille Scholar) at Toronto General Hospital. Preservation of blood in liquid nitrogen; release of clotting activity from platelets; investigation of factors leading to sudden death after cardiac infarction; continuing study of the value of anticoagulant therapy. Dr. J. Morrow at Toronto General Hospital. Treatment of hypertension with drugs.

Dr. J. F. Mustard (M.R.C. Research Associate) at Blood and Vascular Disease Research Unit, University of Toronto and Sunnybrook Hospital. Factors influencing the survival and aggregation of platelets, including alterations of diet, various drugs, etc.; phagocytic functions of platelets; coagulation mechanisms under various conditions in man and animals; characteristics of blood from haemophilic dogs—biochemical, physiological, and physico-chemical; development of atherosclerosis in swine, rabbits, pigeons, and dogs (with Dr. H. C. Rowsell, Ontario Veterinary College, Guelph); study of factors governing the interaction of platelets with endothelium; effect of dietary factors on the development of atherosclerosis in swine. Dr. A. Rapoport at Toronto Western Hospital. Experimental and clinical observations on renovascular hypertension.

Dr. E. D. Wigle at Cardiovascular Unit, Toronto General Hospital. Study of the syndrome produced by rupture of aortic valve cusp; haemodynamic studies in muscular subaortic stenosis and pulmonary hypertension. Dr. J. K. Wilson at St. Michael's Hospital. Application of the technique of cardioversion in 100 patients. Dr. E. R. Yendt at Toronto General Hospital. Diagnostic techniques in patients with suspected renovascular hypertension; physiological correlation of hypertension with renal biopsy (with Dr. Susan Ritchie, Department of Pathology); angiotension assays (with Dr. Moussa Cohanin).

Clinical Chemistry

Dr. W. R. Campbell at Banting Institute. Methods for calcium and magnesium estimations in body fluids etc.

Dermatology

Dr. M. G. William at Ontario Cancer Institute: Investigation of the role of mycoplasma organisms in psoriasis and other diseases; viral implication in skin tumors.

Endocrinology

Dr. C. Ezrin. Classification of the cells of the pituitary gland and analysis of their function. Dr. N. Forbath (with Dr. Hetenyi, Department of Physiology). A study of glucose metabolism in diabetic patients using radioactive glucose. Dr. H. P. Higgins at St. Michael's Hospital. A study of the iodinated compounds in the serum of patients with non-toxic goitre (with Dr. Ivan Elkan); effect of providone-iodine on serum protein bound iodine. Dr. M. W. Johnston (with Drs. C. Ezrin and R. Volpé, and Mr. Vas Row). Iodine metabolism in Hashimoto's Struma, non-toxic nodular goitre and severe myxoedema; study of thyroxine binding proteins (with Miss Amy Britton, Department of Pathological Chemistry); studies of the effect of iodine depletion and anti-thyroid drugs on iodine metabolism in rats (with Dr. E. Schönbaum and Professor E. A. Sellers); assay of thyrotrophin and long acting thyroid stimulator in human blood.

Dr. J. C. Laidlaw at Toronto General Hospital. A re-evaluation of the role of the pituitary in the genesis of Cushing's syndrome; variation in level of protein bound plasma progesterone during the menstrual cycle in females (with Dr. Guy Emery and Mrs. A. Sermat). Dr. J. Alick Little at St. Michael's Hospital. A study of the application of sulphated insulin; measurement of plasma insulin level in patients with various disorders; a long term trial of a new oral anti-diabetic agent (Tolinase). Dr. R. H. Sheppard at Toronto Western Hospital. Serum thyrotrophin assay and its application in thyroid disease and acromegaly. Dr. W. B. Spaulding at Medical Outpatients Department, Toronto General Hospital. Study of blood sugar levels after meals of differing composition.

Dr. Joan Vale at Women's College Hospital (with Dr. Aneta Alaton). Studies of thyroid function. Dr. Robert Volpé at Toronto General Hospital and St. Joseph's Hospital. Hypoglycaemia in relation to retroperitoneal fibrosarcoma and disseminated insulinoma. Dr. Brian Webster at Toronto General Hospital. Release of thyroxin from thyroxin-binding proteins under various conditions; serial observations on thyroid stimulating hormone in patients with Addison's disease, etc.

Gastroenterology

Dr. J. Bingham at Toronto Western Hospital. Studies of psychophysiology in gastric disease. Dr. L. J. Cole at New Mount Sinai Hospital (with Dr. V. Feinman). On the usefulness of gastroscopy and peritoneoscopy. Dr. J. M. Finlay at Toronto General Hospital (with Drs. J. Goldenberg and M. Ali). Assessment of pancreatic function with secretin-pancreozymin test; clinical and laboratory study of gastric cooling; study of gastric muco-proteins (with Dr. Otto Sirek, Physiology); continued study of malabsorption syndrome. Dr. Caroline Hetenyi at Women's College Hospital. Studies on malabsorption syndrome and deficiency states.

Dr. E. J. Prokipchuk at St. Michael's Hospital. Standardized gastric analysis procedure in gastric disease and hyperthyroidism; application of gastric cytology in neoplastic disease; investigations on oesophageal motility with special transducers; detailed studies on a patient with mastocytosis, malabsorption, hypomagnesaemia, etc. Dr. J. C. Sinclair at Toronto General Hospital, and Department of Bacteriology. Isolation of causative agent of infectious hepatitis (with W. G. C. Bearcroft, West African Council for Medical Research, Lagos, Nigeria). Dr. W. B. Spaulding at Toronto General Hospital (with Dr. S. T. Bain, Professor D. B. W. Reid of the School of Hygiene, and Miss E. J. Clarkson of TGH Division of Biometrics). Computer aided analysis of abdominal pain in 300 patients to study the diagnostic differences of hiatus hernia, peptic ulcer, neurosis, and genito-urinary disease.

Haematology and Neoplastic Diseases

Dr. C. J. Bardawill at St. Michael's Hospital. Urinary steroids in patients with carcinoma and leukaemia; relation of special steroid fractions to prognosis in carcinoma of the breast; study of the enzymatic changes in serum and leukocytes in various types of leukaemia. Dr. D. J. Cowan at the Toronto General Hospital. Chemotherapy of malignant disorders; cytogenetic studies in leukaemia; histocompatibility studies in tissue culture. Dr. J. H. Crookston at Toronto General Hospital (with Dr. H. A. Farquharson, Dr. T. W. Fox, Dr. V. Ing, and Dr. S. I. Macvie). Study of the haemoglobinopathies, with the identification of a new type; review of clinical aspects of acquired haemolytic anaemia and thrombocytopenia; platelet survival studies in thrombocytosis and thrombocytopenia (with Drs. Mustard and Herst).

Dr. J. R. Evans at Toronto General Hospital (with Dr. Charles Tator, Department of Surgery). Uptake of radio-iodinated fatty acid by tumours in various tissues. Dr. D. C. H. Ley at Toronto Western Hospital. Alterations in the coagulation mechanisms during open heart surgery; alterations in bone marrow kinetics during hypothermia and cardiovascular surgery; the influence of neoplastic disease on iron absorption; the changes in serum potassium in neoplastic disease and the effect of

therapy; the influence of radiation and chemotherapeutic agents on platelet survival in patients with neoplastic disease; continued study of the treatment of neoplastic disease (with Dr. George Kutas). Dr. E. A. McCulloch at Toronto General Hospital and Ontario Cancer Institute. Studies on stem cells in the bone marrow; elaboration of a model to explain the dynamics of haematopoiesis; quantitation of erythropoietic activity under experimental conditions; cellular proliferation as a concomitant of the immune response.

Dr. J. W. Meakin at Princess Margaret Hospital. A study of iron stores, and the measurement of urinary iron; the effect of steroids on haematopoietic cells; the use of chemotherapeutic agents in the treatment of bronchogenic carcinoma and of asymptomatic lymphoma. Dr. David Watt at the Toronto General Hospital. Study of the value of concentrates of anti-haemophilic globulin from human sources; development of an automatic apparatus for the measurement of coagulation time. Dr. D. M. Whitelaw at Princess Margaret Hospital (with Drs. Alison, Meakin, and Hasselback). Clinical trials of chemotherapeutic agents (Vincristine, 5-Fluorouracil); comparison of various treatment regimens in cancer of the lung, Hodgkin's disease and lymphocytic disease.

Metabolism

Dr. Joan Harrison at Toronto General Hospital and Department of Physics, University of Toronto, Studies of radioactive calcium metabolism, using the whole-body counter. Dr. A. Rapoport at Toronto Western Hospital. Metabolic effects of total fasting in obese patients; magnesium metabolism. Dr. E. R. Yendt at Toronto General Hospital (with Drs. M. Cohanin, S. York, and R. Gagne). An analysis of 500 patients with renal calculi; the use of thiazide drugs to reduce calcium excretion in stone-formers; pyridoxine in the treatment of hyper-oxaluria; the influence of chloroquine in hypercalcaemia due to sarcoidosis; a study of acidosis occurring in patients with hyperparathyroidism and steatorrhoea; renal tubular defects—hypophosphataemic osteomalacia, osteomalacia in renal tubular acidosis, acidosis corrected by bicarbonate administration; magnesium metabolism in hypoparathyroidism and malabsorption; investigation of a young patient with severe osteoporosis.

Neurology

Dr. John Edmeads at Toronto General Hospital. A clinical survey of the Guillain-Barré syndrome. Dr. J. G. Humphrey at Toronto General Hospital. Clinical, electromyographic, and pathological findings in adult neuromuscular disorders; motor nerve conduction in Bell's palsy; study of the effect of decamethonium on the neuromuscular block of myasthenia gravis; histochemical studies of muscle enzymes in neuromuscular disorders; motor nerve conduction velocity in chronic relapsing neuropathies, and the effect of adrenocortical steroids. Dr. Robert Lee at Toronto General Hospital. Clinical investigation of the value of echo-encephalography. Dr. J. L. Silversides and Dr. W. McIlroy at Toronto Western Hospital. A statistical clinical survey of multiple sclerosis patients. Dr. J. R. Wherrett at Toronto General Hospital. Studies of the lipids of brain tissue obtained at operation or post mortem; study of gangliosides in nervous and other tissues.

Psychiatry

Dr. E. F. W. Baker at Toronto Western Hospital. Measurement of conditioned autonomic reflexes; radioactive sodium transfer into cerebrospinal fluid in depressed patients, as compared with normals; comparison of LSD and ephedrine in a series of alcoholic patients. Dr. Dayton M. Forman at Toronto General Hospital. A special study of psychiatric and social problems in patients coming to the Emergency Department. Dr. Robert Pos at Toronto General Hospital. Study of synaptic transmission in the central nervous system in relation to mental illness. Dr. Allan Walters at Toronto General Hospital. Clinical studies of psychogenic pain.

Renal Diseases

Dr. W. T. W. Clarke at Toronto General Hospital. A controlled study of the effectiveness of antimicrobial agents in the prevention of infection in patients with an in-dwelling catheter (with Dr. R. Charron); comparison of various methods of dialysis in uraemic patients, with a view to the feasibility of a chronic dialysis programme. Dr. H. P. Higgins at St. Michael's Hospital (with Dr. A. Bayley). Development of improved methods of using the radioactive renogram in the diagnosis of parenchymal and vascular disturbances in the kidney. Dr. F. M. Hill at Women's College Hospital. Study of bacteriuria in female patients, particularly during pregnancy; evaluation of renal scans, using radioactive material. Dr. J. Alick Little at St. Michael's Hospital. Development of a haemodialysis unit. Dr. A. Rapoport at Toronto Western Hospital. Further studies of the nephropathy associated with analgesic drugs; response to an ammonium chloride load of patients with various types of renal calculus.

Respiratory Diseases

Dr. W. B. Spaulding at Toronto General Hospital (with Dr. M. Lenzner and Dr. D. S. Sanders). Pulmonary manifestations of parasitic diseases. Dr. Colin Woolf at Toronto General Hospital. Investigation of the role of oxygen in the control of respiration; further studies into the mechanism of dyspnoea; therapeutic evaluation of removal of carotid body in intractable asthma; rehabilitation exercises in patients with emphysema, breathing oxygen enriched air.

Rheumatic Diseases and Rehabilitation Medicine

Dr. John S. Crawford at Toronto Western Hospital. Assessment of neuromuscular conduction in the rehabilitation process; review of the results of the care of amputees (with Dr. R. Renaud); study of granulomatous lesions in the nose in rheumatoid arthritis (with Dr. D. T. McNeely). Dr. John Digby at St. Michael's Hospital and University of Toronto Rheumatic Disease Unit. Evaluation of long term results of active therapy of patients in the unit. Dr. M. A. Ogryzlo at Toronto General Hospital and Sunnybrook Hospital. Study of plasma proteins, macroglobulins, anti-nuclear factors and other reactive agents in patients with collagen diseases and rheumatoid arthritis (with Dr. V. Halmos and Mr. Presant); investigation of the value of Allopurinol in hyperuricaemic states (with Dr. J. Houpt); treatment of patients with a diet low in tryptophane (with Drs. A. A. Fletcher, H. Smythe and J. Houpt). Dr. Hugh Smythe at Toronto General Hospital and Sunnybrook Hospital. Studies on the metabolism of uric acid, using radioactive material; correlations among uric acid, platelet turnover, and atherosclerosis and the influence of sulfinpyrazole (with Dr. J. F. Mustard).

PUBLICATIONS

- ADSETT, C. A. "Emotional Reactions to Disfigurement from Cancer Therapy" (*Canadian Medical Association Journal*, vol. 89, no. 9, Aug. 31, 1963, pp. 385-91).
- ADSETT, C. A. and ROSS, W. D. "Management of Neurocirculatory Asthenia" (*Biochemical Clinics*, no. 1, 1963, p. 299).
- BARDAWILL, C. and CHANG, C. "Serum Lactic Dehydrogenase, Leucine Aminopeptidase and 5-nucleotidase Activities: Observations in Patients with Carcinoma of the Pancreas and and Hepatobiliary Disease" (*Canadian Medical Association Journal*, vol. 89, no. 15, Oct. 12, 1963, pp. 755-61).
- BRODER, I. and SCHILD, H. O. "Bronchoconstrictor Effects of Soluble Antigen-antibody Complexes in Isolated Lung, and Their Inhibition by Normal Serum" (*Nature*, vol. 201, no. 4924, 1964, pp. 1137-8).
- BROWN, K. W. G. "Some Aspects of Dicumerol Therapy" (*Hospital Pharmacist*, vol. 16, no. 4, 1963, pp. 177-80).
- BROWN, K. W. G. and MACMILLAN, R. L. "A Critical Evaluation of Initial Heparin Treatment in Acute Myocardial Infarction" (*Proceedings of the International Symposium on Anticoagulants in Coronary Disease, Miami Heart Association*, Jan., 1964).
- "Initial Heparin Therapy in Acute Myocardial Infarction" (*Canadian Medical Association Journal*, vol. 90, no. 24, June 13, 1964, pp. 1345-8).

- BROWN, K. W. G., MACMILLAN, R. L., FORBATH, N., MELIGRANA, F. and SCOTT, J. W. "The Coronary Unit—An Intensive Care Centre for Acute Myocardial Infarction" (*Lancet*, Aug. 17, 1963, p. 349).
- BROWN, K. W. G., WHITEHEAD, E. H. and MORROW, J. D. "Treatment of Cardiac Arrhythmias with Synchronized Electrical Countershock" (*Canadian Medical Association Journal*, vol. 90, no. 3, Jan. 18, 1964, pp. 103-6).
- CHISHOLM, A. W. "Internal Medicine in the Population of the Homes for the Aged in Toronto" (*Applied Therapeutics*, vol. 5, no. 12, Dec., 1963, p. 1051).
- CLARKE, W. T. W. "The Unstable Diabetic" (*Applied Therapeutics*, vol. 5, no. 8, Aug., 1963, pp. 685-7).
- CROOKSTON, J. H. "Hemolytic Anemia"; in *Current Therapy*, ed. H. F. Conn, pp. 183-4. Philadelphia: W. B. Saunders Co. 1964.
- CROOKSTON, H. J., SCOTT, J. G. and DWORATZEK, J. A. "Haemoglobin C Disease in a Sicilian-Canadian Family" (*Canadian Medical Association Journal*, vol. 89, no. 24, Dec. 14, 1963, pp. 1239-41).
- DIGBY, J. W. "The Rheumatic Diseases Unit" (*Health & Welfare Journal*, vol. 18, no. 8, 1963, p. 18).
- EVANS, J. R. "Cellular Transport of Long Chain Fatty Acids" (*Canadian Journal of Biochemistry*, vol. 42, no. 6, 1964, p. 955).
- EVANS, J. R. and HOLLENBERG, C. H. "Fatty Acid Metabolism in the Diabetic Rat Heart" (*Journal of Clinical Investigation*, Abstract, June, 1964).
- EVANS, J. R. and JACOBS, M. H. "Fatty Acid Metabolism in the Hypoxic Rat Heart" (*Federation Proceedings*, Abstract 23, 1964, p. 542).
- EVANS, J. R., OPIE, L. H. and RENOLD, A. E. "Pyruvate Metabolism in the Perfused Rat Heart" (*American Journal of Physiology*, vol. 205, no. 5, 1963, p. 971).
- EVANS, J. R., OPIE, L. H. and SHIPP, J. C. "Metabolism of Palmitic Acid in Perfused Rat Heart" (*American Journal of Physiology*, vol. 205, no. 6, 1963, p. 766).
- EZRIN, C. "The Pituitary Gland" (*Ciba Clinical Symposium*, vol. 15, no. 3, 1963, pp. 71-100).
- "Resistance and Allergy to Insulin" (*Applied Therapeutics*, vol. 5, no. 8, Aug., 1963, pp. 680-4).
- EZRIN, C., CHIAKOFF, R. and HOFFMAN, H. "Panhypopituitarism Caused by Hand-Schüller-Christian Disease" (*Canadian Medical Association Journal*, vol. 89, no. 25, Dec. 21, 1963, pp. 1290-3).
- EZRIN, C. and MURRAY, S. "The Cells of the Human Adenohypophysis in Pregnancy, Thyroid Disease and Adrenal Cortical Disorders" (*Cytologie de l'Adénohypophyse*, published by Editions du Centre National de la Recherche Scientifique, Paris, 1963, pp. 183-99).
- FINLAY, J. M. "Use of the Laboratory in the Diagnosis of Malabsorption Syndrome" (*Medical Clinics of North America*, vol. 48, no. 1, 1964, p. 117).
- FINLAY, J. M., MORTIMER, D. C., REED, P. I. and VIDINLI, M. "The Role of the Upper Gastrointestinal Flora in the Malabsorption Syndrome" (*Canadian Medical Association Journal*, vol. 90, no. 9, Feb. 29, 1964, pp. 559-64).
- FINLAYSON, D. M. *et al.* "Hydatid Disease in Toronto" (*Canadian Medical Association Journal*, vol. 88, no. 20, May 18, 1963, pp. 1004-9).
- HARRISON, J. "The Fate of Radioiodine Applied to Human Skin" (*Health Physics*, vol. 9, no. 10, Oct., 1963, pp. 993-1000).
- HARRISON, J. and MCNEILL, K. G. "Effect of Chlorothiazide on Cesium 137 Excretion in Human Subjects" (*Canadian Medical Association Journal*, vol. 89, no. 25, Dec. 21, 1963, pp. 1266-9).
- HASSELBACK, R. C. *et al.* "Virus-like Particles in Blood of Two Acute Leukemia Patients" (*Science*, vol. 142, no. 3598, 1963, pp. 1487-9).
- HETENYI, C. and O'SULLIVAN, P. "A Comparison of Laboratory Tests in the Malabsorption Syndrome" (*Canadian Medical Association Journal*, vol. 90, no. 3, Jan. 18, 1964, pp. 116-21).
- HIGGINS, H. P. *et al.* "The Effect of Povidone-Iodine (Betadine) on Serum Protein-Bound Iodine, When Used as a Surgical Preparation on Intact Skin" (*Canadian Medical Association Journal*, vol. 90, no. 23, June 6, 1964, pp. 1298-1300).
- HOGARTH, W. J. "Jaundice Associated with Methandro-sterone (Danabol) Administration" (*Canadian Medical Association Journal*, vol. 88, no. 7, Feb. 16, 1963, pp. 368-71).
- HUMPHREY, J. G. and REWCASTLE, N. B. "Vacuolar Myopathy" (*Transactions of American Neurological Association*, vol. 88, 1963, pp. 225-6).
- HUNT, B. J. and YENDT, E. R. "The Response of Hypercalcemia in Sarcoidosis to Chloroquine" (*Annals of Internal Medicine*, vol. 59, 1963, p. 554).
- KERBAL, N. A. and HILLIARD, I. M. "Halothane Hepatotoxicity" (*Canadian Medical Association Journal*, vol. 89, no. 18, Nov. 2, 1963, pp. 944-6).
- KOFMAN, O., PRICHARD, J. S. *et al.* "Subacute Inclusion Encephalitis: A Clinical and Pathological Review" (*Canadian Medical Association Journal*, vol. 90, no. 6, Feb. 8, 1964, pp. 401-8).
- LAIDLAW, J. C., YENDT, E. R., BIRD, C. E. and GORNALL, A. G. "Hypertension Due to Renal

- Artery Occlusion Simulating Primary Aldosteronism" (*Canadian Medical Association Journal*, vol. 90, no. 4, Jan. 25, 1964, pp. 321-5).
- LENKEI, S. and GORDON, J. A. L. "Thyrotoxicosis Associated with Myocardial Infarction" (*Canadian Medical Association Journal*, vol. 90, no. 19, May 9, 1964, pp. 1128-9).
- LEY, D. "Current Concept of Iron Metabolism" (*Canadian Medical Association Journal*, Editorial, vol. 89, no. 22, Nov. 30, 1963, pp. 1148-9; and no. 23, Dec. 7, 1963, pp. 1196-7).
- LITTLE, J. A. and SHANOFF, H. M. "Studies of Male Survivors of Myocardial Infarction Due to 'Essential' Atherosclerosis" (*Canadian Medical Association Journal*, vol. 89, no. 19, Nov. 9, 1963, pp. 961-74).
- MACDONALD, R. I. "Postgraduate Medical Education" (*University of Toronto Medical Graduate*, 10, vol. 2, 1964, pp. 8-9).
- MCCULLOCH, E. A. and BRUCE, W. R. "Effect of Hypoxia on Colony-forming Cells of the Mouse" (*Federation Proceedings*, vol. 22, no. 2, 1963, pp. 664, Abstract).
- "The Effect of Erythropoietic Stimulation on the Hemopoietic Colony-forming Cells of Mice" (*Blood*, vol. 23, 1964, pp. 216-32).
- MCCULLOCH, E. A., SIMINOVITCH, L. and TILL, J. E. "A Stochastic Model of Stem Cell Proliferation" (*Physicians in Canada*, vol. 19, 1963, p. 10, Abstract).
- McKELVEY, A. D. "Mitral Stenosis" (*Modern Medicine in Canada*, 19, vol. 3, 1964, pp. 55-65).
- MELIGRANA, F., HAWKS, H. and MAROTTA, T. "Hemophilus Influenzae Septicemia with Polyarthritides and Meningitis in an Adult" (*Canadian Medical Association Journal*, vol. 89, no. 3, July 20, 1963, pp. 132-4).
- MUSTARD, J. F. and MURPHY, E. A. "Blood Platelet Economy during Moderate and Intensive Heparin Therapy" (*Blood*, vol. 22, no. 1, July, 1963, pp. 1-8).
- "Effect of Smoking on Blood Coagulation and Platelet Survival in Man" (*British Medical Journal*, vol. 1, March, 1963, pp. 846-9).
- OGRYZLO, M. A. "Drugs for Gout" (*Canadian Medical Association Journal*, vol. 90, no. 9, Feb. 29, 1964, pp. 589-90).
- OPIE, L. H. "Diabetic Acidosis" (*Applied Therapeutics*, vol. 5, no. 9, Sept., 1963, pp. 745-9).
- OPIE, L. H. and CONEN, P. E. "Masked Mongolism: Group 21 Trisomy in a 53-year-old Woman" (*American Journal of Medicine*, vol. 35, no. 1, 1963, pp. 135-42).
- OPIE, L. H., EVANS, J. R. and SHIPP, J. C. "Effect of Fasting on Glucose and Palmitate Metabolism of Perfused Rat Heart" (*American Journal of Physiology*, vol. 205, no. 6, 1963, p. 1203).
- OPIE, L. H., TODD, I. A. D. and ALLEN, E. A. "Genitourinary Blastomycosis" (*Canadian Medical Association Journal*, vol. 89, no. 24, Dec. 14, 1963, pp. 79-82).
- OWEN, T. "Use and Abuse of Drugs" (*Applied Therapeutics*, vol. 6, no. 1, 1964, p. 30).
- RAE, J. M. "Religion Contributes to Mental Illness" (*Anglican Dialogue*, vol. 2, no. 2, spring, 1963, pp. 9-19).
- RAPOPORT, A. "The Use of Sodium and Potassium Salts in Acidosis" (*Canadian Medical Association Journal*, vol. 90, no. 13, Mar. 28, 1964, pp. 785-6).
- RAPOPORT, A., MEEMA, H. E. and SHEPPARD, R. H. "Roentgenographic Visualizations and Measurement of Skin Thickness and its Diagnostic Application in Acromegaly" (*Radiology*, vol. 82, no. 3, 1964, pp. 411-17).
- RAPOPORT, A., STREETEN, D. H. P. and CONN, J. W. "Existence of a Slowly Exchangeable Pool of Body Sodium in Normal Subjects and its Diminution in Patients with Primary Aldosteronism" (*Journal of Clinical Endocrinology and Metabolism*, vol. 23, no. 9, 1963, pp. 928-37).
- RAPOPORT, A., WILSON, D. R., RANKING, G. N., WHITE, L. W. and RUDD, W. W. H. "Separate Renal Function Studies in Dogs with Chronic Unilateral Renal Artery Obstruction—the Effect of Hypertonic Urea Infusions" (*Canadian Journal of Biochemistry & Physiology*, vol. 41, no. 11, 1963, pp. 2273-85).
- RICHARDSON, J. C. and EINHORN, R. W. "Clinical Neurosurgery" (*Clinical Neurosurgery*, Congress of Neurosurgery, vol. 9, 1963, pp. 114-31).
- RICHARDSON, J. C., STEELE, J. and OLSZEWSKI, J. "Supranuclear Ophthalmoplegia, Pseudobulbar Palsy, Nuchal Dystonia and Dementia" (*Transactions of the American Neurological Association*, vol. 88, 1963, pp. 25-9).
- ROSEN, P. S. and GRAHAM, W. "Shoulder-hand Syndrome in Coronary Disease" (*Geriatrics*, vol. 18, no. 7, 1963, pp. 525-32).
- ROW, V. V., EZRIN, C., VOLPE, R. and JOHNSTON, M. W. "Chromatographic Identification of Tetraiodothyroacetic Acid (Tetrac) in a Human Thyroid Nodule" (*Journal of Clinical Endocrinology and Metabolism*, vol. 23, no. 8, 1963, p. 8).
- SCOTT, J. W. "Medicine as a General Education" (*Canadian Medical Association Journal*, vol. 90, no. 14, Apr. 4, 1964, pp. 869-71).
- SPAULDING, W. B. "Diabetic Acidosis" (*Applied Therapeutics*, vol. 5, no. 9, Sept., 1963, pp. 745-9).
- SPAULDING, W. B., SPITZER, W. O. and TRUSCOTT, P. W. "Aglycosuric Diabetes" (*Canadian Medical Association Journal*, vol. 89, no. 8, Aug. 24, 1963, pp. 329-33).
- SPAULDING, W. B. and YENDT, E. R. "Prolonged Vitamin D Intoxication in a Patient with

- Hypoparathyroidism" (*Canadian Medical Association Journal*, vol. 90, no. 18, May 2, 1964, pp. 1049-54).
- STEELE, J. C., RICHARDSON, J. C. and OLSZEWSKI, J. "Progressive Supranuclear Palsy" (*Archives of Neurology*, vol. 10, no. 4, April, 1964, pp. 333-59).
- VOLPE, R. "Drugs for Hypogonadism" (*Canadian Medical Association Journal*, vol. 90, no. 18, May 2, 1964, pp. 1081-2).
- WALTERS, J. A. "The Psychological Aspects of Bodily Pain" (*Applied Therapeutics*, vol. 5, no. 10, Oct., 1963, pp. 853-6).
- WHERRETT, J. R. and CUMINGS, J. N. "A Contribution to the Biochemistry of Tay-Sachs Disease" (*Transactions of the American Neurological Association*, vol. 88, 1963, pp. 108-11).
- WHITELAW, D. M. "Pain in Multiple Myeloma" (*Canadian Medical Association Journal*, vol. 88, no. 20, June 22, 1963, pp. 1242-3).
- WHITELAW, D. M., COWAN, D. H., CASSIDY, F. R. and PATTERSON, T. A. "Clinical Experience with Vincristine" (*Cancer Chemotherapy Reports*, no. 30, July, 1963, p. 13).
- WIGHTMAN, K. J. R. "Antimicrobial Therapy" (*Medical Services Journal*, vol. 20, no. 5, May, 1964, pp. 494-5).
- "Pitfalls in the Management of Geriatric Patients" (*Applied Therapeutics*, vol. 6, no. 1, Jan., 1964, pp. 26-9).
- WIGLE, E. D. "Aortic Stenosis" (*Modern Medicine of Canada*, vol. 19, no. 6, 1964, pp. 51-60).
- WIGLE, E. D., CHRYSOHOU, A., HEIMBECKER, R. O., GUNTON, R. W., GREENWOOD, W. F. and BIGELOW, W. G. "Idiopathic Ventricular Septal Hypertrophy Causing Muscular Subaortic Stenosis" (*Memoirs IV World Congress of Cardiology*, vol. 1A, 1963, p. 112).
- WIGLE, E. D., LENKEI, S. C. M., CHRYSOHOU, A., and WILSON, D. R. "Muscular Subaortic Stenosis: The Effect of Peripheral Vasodilatation" (*Canadian Medical Association Journal*, vol. 89, no. 17, Oct. 26, 1963, pp. 896-9).
- WILSON, D. R. and YENDT, E. R. "Treatment of the Adult Fanconi Syndrome with Oral Phosphate Supplements and Alkali: Report of Two Cases Associated with Nephrolithiasis" (*American Journal of Medicine*, vol. 35, no. 1, 1963, p. 487).
- WOOLF, C. R. and ROSENBERG, A. "The Objective Assessment of Cough Suppressants under Clinical Conditions Using a Taperecorder System" (*Thorax*, vol. 19, no. 2, 1964, p. 125).
- WOOLF, C. R. and ROTMAN, H. "The Diffusing Capacity of the Lungs at Rest and during Exercise in Adults with Atrial or Ventricular Septal Defect" (*Diseases of the Chest*, vol. 43, no. 6, 1963, p. 613).

OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor D. E. Cannell

The anticipated changes in undergraduate teaching and examinations reported last year have been completed. At the moment it is difficult to determine their effectiveness. Elimination of final oral examinations as a part of University qualification seems to have been advantageous.

In two respects undergraduate teaching and training have been and still are unsatisfactory. Students, with few exceptions, have little opportunity to conduct deliveries. This has been rectified in minor degree, but still leaves much to be desired. Student experience with gynaecologic malignant conditions, particularly carcinoma of the cervix, has been unsatisfactory, and this deficiency has been intensified since the establishment of the Princess Margaret Hospital. It is to be hoped that arrangements can be made to overcome these inadequacies in undergraduate teaching.

Postgraduate training has been modified to a slight degree with some improvement.

The number and quality of patients available for study by both undergraduate and postgraduate students has been well maintained and in some teaching units has shown a slight though gratifying increase in numbers. It is hoped that this trend will be maintained.

The Department is pleased to report the success of Doctors V. W. Bustard, J. J. A. Fraser, D. E. Murphy, C. S. Russell, M. A. Stewart-Burton, J. D. Trelford, and G. Urbach in obtaining their Fellowship in The Royal College of Physicians and Surgeons of Canada.

Doctors Bustard, Fraser, and Murphy have established practices in Ontario;

Doctor Stewart-Burton is doing a further year of study and practice at Middlesex Hospital, London, England under the direction of Mr. W. Ralph Winterton, a former Visiting Professor in the Department. She is the third postgraduate student from this Department who has undertaken this course. It is hoped that this relationship between these departments may be continued.

Doctor Russell is pursuing a year's study in Great Britain and Europe in clinical endocrinology. He is being supported by a McLaughlin Travelling Fellowship.

Doctors W. J. Hannah, D. C. Moore, and Richard Wilson have returned after study abroad to join the staff of the Women's College and Toronto General Hospitals.

Three short refresher courses for general practitioners were held in November, January, and April of this academic year. These were received with enthusiasm. Modification of succeeding courses as indicated made for further satisfaction for both participants and teachers. Plans are being formulated by the Curriculum Committee of the Department for a more extended and intensive course for qualified obstetricians and gynaecologists. It is hoped that this may be instituted in the next academic session.

The Department was honoured by visitors from abroad, including Professor Lance Townsend of Melbourne, Australia, who spent two weeks in Toronto as the McLaughlin Foundation-Edward Gallie Visiting Professor; Dr. Yvonne Pinto Do Rosario, a Colombo Plan Fellow from New Delhi, India who spent six months in the Department; Ian MacGillivray, London, England; Professor Alois Vasicka, Galveston, Texas; Dr. E. A. Awoliyi, Lagos, Nigeria; Professor Coralie Rendle Short, Kampala, Uganda; Dr. M. Sastrawinangoen, a Colombo Plan Fellow from Indonesia; Dr. Charles Taylor, Birmingham, England; Dr. G. W. Theobald, London, England.

The staff has continued to participate in scientific meetings throughout this country, in the United States and abroad, and many have contributed to postgraduate and refresher courses in other Canadian Medical Schools.

The First International Symposium on Progestogen-oestrogen Compounds was held in April in Toronto. Professor Cannell introduced the guest speaker, Dr. John Rock, Director of the Rock Reproductive Clinic, Inc. and Clinical Professor of Gynaecology, Emeritus, Harvard Medical School. Several staff members made presentations at this meeting.

Our staff, in association with members of other Medical Schools across Canada, contributed a Symposium on Maternal Mortality which was published in *Clinical Obstetrics and Gynaecology* in December, 1963. Professor Cannell was Guest Editor of this Symposium. This was the first Canadian presentation in this publication and proved most successful.

Facilities for investigative work in the Department have been provided in the Banting Institute Steroid Laboratory through a grant of funds from S. C. Johnson & Son, Ltd. of Brantford and the Medical Research Council. The Dominion Stores have through their Research Fellowship continued to provide support to the Department's research activities. We acknowledge with gratitude the generosity of these donors.

The Department has had increased space and facilities made available in the Toronto General Hospital for clinical investigation. This, together with extensive use of the Clinical Investigation Unit, has been of great assistance to our programme. The Department is grateful to the Administrator of the Toronto General Hospital and his staff for their cooperation in this and many other matters affecting work in Obstetrics and Gynaecology.

The Department records with regret the retirement of Doctor M. C. Watson. He has served the Toronto General Hospital and the Department for many years. His contribution to undergraduate and postgraduate teaching has been of great assistance. He will continue in private practice.

The Head of the Department wishes to thank all his colleagues in the Department, Faculty, and University for their cooperation and assistance during the past

year. The sympathetic and helpful consideration of Dean Hamilton is also greatly appreciated.

RESEARCH

Members of the staff have undertaken the following research work.

Doctor T. A. Doran and Doctor J. L. Harkins have completed their investigations of a progestational agent, BDH 1298.

Doctor Doran, with a grant from the Ontario Cancer Treatment and Research Foundation, has also continued his study of malignant cells in peripheral blood in patients with gynaecologic malignancy. He is also engaged in a combined study with the Department of Laboratories of the Toronto General Hospital in patients with Rh sensitization.

Doctor J. A. Low has continued his studies of foetal oxygenation, metabolic state, and anaerobic metabolism as reflected in the umbilical cord at delivery. Maternal, placental pool, and foetal relationships of these factors are also being studied. A second stage of the study of the significance of asymptomatic bacteriuria in the normal obstetric patient is under way. A number of clinical problems are under study in the bladder function clinic. Specific investigations of function are being carried out with radiological and intra-urethral vesical pressure techniques.

Dr. J. W. Millson has been preparing a chart review of endometrial carcinoma. He has completed a five-year survey except for follow-up and plans to carry on another survey of a further five-year period.

Dr. T. G. Ryley has continued his study of patients with amenorrhoea, intersexuality, and other congenital abnormalities. Interest has centred mainly on the tissue of spontaneous abortions and a chromosomal analysis of the foetal cells.

Doctor C. P. Vernon has continued his progestational steroid study in relation to endometrial carcinoma. In cooperation with Dr. Fitzpatrick of the Princess Margaret Hospital, an assessment of the use of adjunctive chemotherapy and radiotherapy in the treatment of advanced pelvic malignancy has been undertaken. With Doctors Cinadar and Rider of the Princess Margaret Hospital, work is continuing on the immunotherapy of choriocarcinoma.

Doctor Richard Wilson, with his associate Doctor Saul Cohen, is investigating the secretion and excretory conjugation patterns of oestrogen metabolites during pregnancy and their relationships to foetal well-being. They are also studying the human foetal adrenal cortex. Doctor Cohen is investigating the factors modifying the hydrolysis of oestrogen conjugates of late pregnancy in urine.

PUBLICATIONS

- ALLEMANG, W. H. "Hemorrhage as a Cause of Maternal Mortality" (*Clinical Obstetrics and Gynecology*, vol. 6, no. 4, Dec., 1963, pp. 825-41).
- "Indications for Progestational Steroid Therapy" (*Applied Therapeutics*, vol. 6, no. 5, May, 1964, pp. 431-2).
- CANNELL, D. E. "Foreword to Symposium on Maternal Mortality" (*Clinical Obstetrics and Gynecology*, vol. 6, no. 4, Dec., 1963, p. 823).
- DORAN, T. A. and SHIER, C. B. "Conization of the Cervix" (*American Journal of Obstetrics and Gynecology*, vol. 88, no. 3, Feb. 1, 1964, pp. 367-74).
- GILLIES, J. D. "Doctor or Philosopher" (*Applied Therapeutics*, vol. 6, no. 5, May, 1964, pp. 429-30).
- HANNAH, W. J. "Medical Education in Europe—A Comparative Study" (*Canadian Medical Association Journal*, vol. 90, no. 14, Apr. 4, 1964, pp. 856-62).
- HARKINS, J. L. "Indirect Obstetric Causes of Maternal Mortality" (*Clinical Obstetrics and Gynecology*, vol. 6, no. 4, Dec., 1963, pp. 879-91).
- HENDERSON, D. N. and WILSON, R. "Abdominal Pregnancy" (*American Journal of Obstetrics and Gynecology*, vol. 88, no. 3, Feb. 1, 1964, pp. 356-60).
- LOW, J. A. "Clinical Characteristics of Patients with Demonstrable Urinary Incontinence" (*American Journal of Obstetrics and Gynecology*, vol. 88, no. 3, Feb. 1, 1964, pp. 322-35).
- LOW, J. A., KERR, N. D. and COCHEN, A. R. "Plasma and Blood Volume of the Normal Newborn Infant and Patterns of Adjustment in Initial 24 Hours of the Neonatal Period" (*American Journal of Obstetrics and Gynecology*, vol. 86, no. 7, Aug. 1, 1963, pp. 886-92).

OPHTHALMOLOGY

Under the direction of Professor Clement McCulloch

Fifteen graduate students have been registered in the three-year graduate training programme in Ophthalmology during 1963-64. Dr. I. O. Drysdale of Halifax, Nova Scotia and Dr. C. J. Radford of Toronto were Canadian National Institute for the Blind Fellows. Dr. J. A. Parker of Toronto was a Fellow supported by a Defence Research Board of Canada Grant and Dr. R. L. Alexander was a Fellow under a Dominion-Provincial Public Health Grant. Dr. H. J. McCartney of Toronto was participating in the graduate training programme, aided by a Medical Research Council Grant and Dr. Bela Orosdy of Hungary was taking one year of graduate training in the specialty. Dr. Lakshmi Narain of Asansol, India, Dr. D. M. Mirza of West Pakistan, and Dr. J. Aragones of the Philippines, occasional students, were registered in the Postgraduate Division of the Faculty. Dr. J. D. Morin, Dr. G. M. Cobb, Dr. L. D. J. Chisholm, Dr. D. M. Dorsey, and Dr. J. F. Morgan completed the graduate training programme.

The Department has continued to give training in Ophthalmology to the undergraduates of the third and fourth medical years. Teaching in the third year is confined to ophthalmoscopy. In the final medical year, Ophthalmology is studied since it will be useful in General Practice.

The Fourth Annual Meeting of the University of Toronto Eye Alumni was held on November 29. The five senior residents gave papers competing for the Alumni Prize. Dr. J. F. Morgan received the prize for his paper entitled "A Clinical Trial of the Use of Silicone Fluid with Artificial Eyes." Dr. Derrick Vail, Chairman of the International Council of Ophthalmology, gave the Walter Wright Lecture. He spoke on "The Loss of Vitreous after Cataract Extraction." The Alumni have been active during the year, holding several meetings, publishing a newsletter, and supporting the Department through the A. J. Elliot Residents' Travel Fund.

On January 6, the Department was host to the East Central Section of the Association for Research in Ophthalmology, of which Dr. Clement McCulloch is Chairman. Members of the Department contributed five papers to a crowded day's programme. Of particular interest was the presentation by Drs. J. S. Speakman and J. S. Crawford of an explanation for cases of congenital oedema of the cornea. Dr. C. G. Smith and Dr. F. Richardson of the Department of Anatomy contributed to this programme, as did speakers from many centres in Eastern Canada and the United States.

The Sixth Annual Research Meeting of the Department was held on March 20. Dr. Paul A. Cibis of St. Louis, Missouri was the guest of honour. He spoke on "Some Basic Mechanisms in the Pathogenesis of Idiopathic Retinal Detachment" and "The Management of Complicated Retinal Detachments." The four Fellows in the Department gave papers competing for the John Gaby Prize. Dr. I. O. Drysdale was awarded the Prize for his study of "Corneal Transplants in Anaesthetic Corneae." Members of the Department presented papers covering their work in the areas of glaucoma, diabetes, retinal detachment, and cryosurgery, corneal chemistry and cytology, corneal transplantation, and visual physiology. The twenty papers given were a good indication of the wide interests of the members of the Department. We are indebted to Mr. H. G. Stapells, who has strongly supported the basic work in the Department.

On June 25, 26, and 27 the Annual Eye Surgery Refresher Course was held. The two guests of honour were Mr. M. J. Roper-Hall of Birmingham and Dr. Webb P. Chamberlain of Cleveland. Mr. Roper-Hall discussed complications of intraocular surgery and ocular trauma. Dr. Chamberlain outlined recent advances in ocular muscle balance. The staff of the Department contributed with discussions on a wide range of subjects in the field of ocular surgery. They also put on operating room demonstrations in all of the teaching hospitals.

The Department has now developed a programme of regular eye clinics and special eye clinics, encompassing all of the teaching hospitals. By this means, besides undertaking the regular service load, we offer opportunities for advanced study and treatment of retinal detachment, glaucoma, corneal disease, refraction, low vision, contact lens problems, diabetic retinopathy, lacrimal sac problems, ophthalmic plastic surgery, neuroophthalmic problems, ocular muscle balance, and orthoptics. We also offer special services including tonography, tonometer testing, orthoptics, study of ocular tumours using radioactive isotopes, ocular pathology, and the Eye Bank. Each of the staff of the Department has undertaken special work contributing to the programme. These services have been greatly appreciated by the neighbouring practitioners.

It is only possible to mention a few of the staff's scholarly visits and participations in outside conferences. Dr. A. Lloyd Morgan was an invited speaker at the First International Congress on Strabismus at Palm Springs, California. Dr. M. Shusterman attended the Glaucoma Discussion Meeting, sponsored by the National Society for the Prevention of Blindness in New York. He also visited major American centres, studying retinal detachment. Dr. B. Teichman visited the National Institute of Ophthalmology in Madrid. Dr. Gordon Kelly addressed the Montreal Ophthalmological Society, discussing cataract surgery. Dr. J. S. Crawford has been active as Chairman of the Panel on Visual Problems of the Defence Research Board, attending a number of meetings. He also gave four papers at the Annual Eye, Ear, Nose, and Throat Conference in Vancouver. Dr. W. S. Hunter has returned to the Department after a year spent studying ophthalmic pathology at the Armed Forces Institute of Pathology, Washington D.C. and at the University of California Medical Center, San Francisco. He has been an R. S. McLaughlin Travelling Fellow. Dr. P. K. Basu attended the winter meeting of the Association for Research in Ophthalmology in Phoenix. He also visited research laboratories and corneal clinics at the Retina Foundation, Boston, Columbia University Eye Department, New York, and the Eye Bank for Sight Restoration, New York. Dr. M. Shea participated in the University of Iowa Symposium on Retinal Detachment where traumatic retinal detachment was discussed. Dr. H. R. Hausler participated in a Symposium on "Microangiopathy of Diabetes," at Cherry Hill Inn, New Jersey. Dr. Clement McCulloch gave a paper on choroideremia at the New York Academy of Medicine and a paper on uveitis before the Buffalo Ophthalmological Society. Drs. J. S. Speakman, C. B. Mortimer, and H. R. Hausler arranged a Symposium on Diabetic Retinopathy at the Ontario Medical Association Meeting. Also, the staff contributed to the major ophthalmic meetings of the year held by Canadian and the American Ophthalmological Societies (the American Academy of Ophthalmology and the Canadian Medical Association) and has continued its support of our local societies, particularly the Eye Section, Toronto Academy of Medicine. The Eye Department has internationally recognized authorities in nearly every field of the specialty.

It should be mentioned that the Eye Staff of the Hospital for Sick Children has completed a textbook on paediatric ophthalmology. This is the first comprehensive book on this subject and should be an outstanding contribution.

Members of the Department have held important positions in national and international ophthalmology during the year. Dr. J. S. Crawford is on the Council of the Canadian Ophthalmological Society. Dr. R. G. C. Kelly is President of the Pan-American Association for Ophthalmology and Secretary of the Canadian Ophthalmological Society. Dr. Clement McCulloch is Chairman of the East Central Section of the Association for Research in Ophthalmology and is Assistant Editor of the *Transactions* of the American Ophthalmological Society. Dr. J. C. Hill has been the first Canadian to receive the Certificate of Award from the American Academy of Ophthalmology and Otolaryngology for his work in Ophthalmology. Dr. George Thompson is Medical Director, Eye Bank of Canada, Ontario Division.

The Department has been visited by a number of distinguished ophthalmologists. Of particular interest has been the visit of Mr. J. H. Redmond Smith of Moorfields

Eye Hospital, London. He worked in the Department as a National Research Council-Nuffield Lecturer for six weeks, contributing greatly to the teaching and research programmes. We have been fortunate to have the assistance of Dr. T. Yamashita who has been contributing to our work in the field of electron microscopy.

The Department is appreciative of a grant from the Atkinson Foundation supporting the special contact lens clinic at the Toronto Western Hospital. Money from the Selkirk Eye Foundation Fund, the Alumni Fund, and the R. A. Reeve Fund has aided studies in ocular disease. The A. E. MacDonald Foundation and the American Women's Club of Toronto have supported the Department in the purchase of books. The Canadian National Institute for the Blind and the A. E. Baker Foundation have supported two graduate students and have aided in Dr. Y. Matuk's studies on the chemistry of the cornea. The Institute for the Blind's aid in the departmental programme is particularly appreciated.

The Department is happy to welcome Dr. Y. Matuk who is studying the chemical changes in the cornea. Also, a welcome is extended to Dr. W. S. Hunter, who joins the staff of St. Michael's Hospital and takes charge of Ophthalmic Pathology. With regret we note the retirement of Dr. A. L. Morgan from his teaching duties; he has been so prominent in the Department as Chief of Ophthalmology at the Hospital for Sick Children. We wish him well as he continues in practice.

The Head of the Department would like to thank all the staff for their continued interest and effort during the academic year. The Department has grown in status because of the prominence that every member has reached in ophthalmic affairs. We thank the technical staff and secretaries who have so immediately aided the programme.

RESEARCH

With the aid of the National Health grant for "Eye Bank and Corneal Transplantation" Dr. P. K. Basu continued his studies on the problems of corneal grafting and vitreous implantation with the assistance of Dr. I. O. Drysdale, Mr. F. Carre, Mrs. I. Fielding, and Mrs. L. Schubert. A comprehensive study on the cytology of the cornea and vitreous is continuing. Dr. Basu assisted by Dr. P. Sarkar of the Department of Botany, is studying the karyology of corneal grafts and diseased cornea. Their studies on the chromosomes of patients suffering from various hereditary eye diseases are continuing. Dr. Basu and Mr. Carre are studying the behaviour of corneal tissue *in vitro*. Mrs. Fielding and Dr. Basu are studying the immunology of the cornea using fluorescence microscopy. Dr. Drysdale and Dr. Basu are studying the effects of corneal grafting on anaesthetic cornea.

Dr. L. Narain, a Colombo Plan Fellow from India, and Dr. Basu, with the assistance of Dr. D. G. Baker of the Banting and Best Medical Research Department, and Mr. N. Matuk are studying the effects of radiation of the donor material in an investigation on the corneal graft reaction. Dr. Basu, with the assistance of Drs. C. H. Tator, T. P. Morley, J. Olszewski, and Mrs. M. Preissig of the Departments of Neuropathology and Neurosurgery has been studying the immunities of the anterior chamber of the eye using human brain tumour transplants into the eyes of guinea pigs. Dr. Basu and Dr. T. M. Sibay, assisted by Mrs. L. Schubert, continued their studies on the behaviour of transplanted cells of different nature under various experimental conditions. Drs. Basu and Sarkar and Mr. Carre are studying cellular interrelationship by using "parabiotic" cultures of the corneal and spleen cells.

In conjunction with the Canadian National Institute for the Blind, Mrs. A. Wolf is continuing her work for the Eye Bank of Canada (Ontario Division). Since 1956, when the Eye Bank was first started, 1,691 eyes have been donated. Seven hundred and eighty-three eyes have been used for corneal transplantation and vitreous implantation, after being examined and processed in the Eye Bank Laboratory in the Banting Institute under the supervision of Dr. Basu.

The Corneal Research Clinic continues to operate twice every month in the Toronto General Hospital under the direction of Dr. G. A. Thompson, the medical

director of the Eye Bank of Canada (Ontario Division), in collaboration with Drs. C. McCulloch, P. K. Basu, and W. P. Callahan.

Dr. Y. Matuk and Mrs. Z. Duma are studying the proteins of the cornea using amino acids marked with radioisotopes. This work has been supported by a National Health Research Grant entitled "Studies of the Cornea," and aided by a Medical Research Council grant entitled "Protein Metabolism of the Cornea."

Under another Medical Research Council grant awarded to Dr. Basu, Dr. H. J. McCartney, with the cooperation of Dr. A. G. Gornall of the Department of Pathological Chemistry, is conducting an investigation on the intraocular penetration of steroids using autoradiographic techniques.

Under a National Health grant entitled "Prevention of Blindness from Glaucoma," Dr. J. S. Speakman has continued morphological studies concerning the pathogenesis of glaucoma and has also conducted a clinical pathological study on congenital anomalies of the anterior chamber involving the cornea and filtration angle. Dr. R. K. MacDonald, with the assistance of Mr. N. Matuk and Miss D. Kisielius, is studying changes produced by prolonged filtration on blood and aqueous circulation. With channelled setons 1/1000 inch thick, Dr. MacDonald has been able to obtain filtration in rabbits even up to eight months. He has found encouraging results by using setons in 12 advanced cases of glaucoma.

The Glaucoma Clinic under the grant has been operating in the Toronto General Hospital under the direction of Dr. Speakman.

Miss T. Fredette has been appointed to continue tonography and to run the Tonometer Testing Station in the glaucoma laboratory at the Toronto General Hospital.

Under a National Health grant entitled "Clinical Investigation of Ideopathic Retinal Detachment," Drs. M. Shea and C. B. Mortimer, assisted by Dr. R. L. Alexander, are continuing experiments on the effects of controlled freezing on the sclera. Dr. Shea is taking special interest in traumatic detachment and in the use of silicone in retinal detachment surgery. He and Dr. Alexander have made a study on the ischaemic necrosis of the anterior uvea. Dr. Mortimer made a survey on 100 cases of vitreous haemorrhage and found that the commonest causes were retinal holes without detachment and retinal detachment. Dr. Shea continued to direct a special retina clinic at St. Michael's Hospital and Dr. Mortimer another in the Toronto General Hospital.

With the aid of a National Health grant entitled "Studies on the Prevention and Treatment of the Ocular Complications of Diabetes," Dr. H. R. Hausler and Dr. T. M. Sibay, with the assistance of Miss B. Stachowska, have continued their research on diabetic retinopathy. Retinopathy was produced in Chinese hamsters by the induction of a metahypophyseal type of diabetes with growth hormone and cortisone. The biochemical and histological alterations in this type of diabetes were studied in cooperation with Dr. J. C. Campbell of the Department of Physiology. The vascular pathology of human diabetic retinopathy was investigated with the use of injection and digestion techniques. Since changes in the pericytes of the retinal capillaries seem to precede the development of diabetic retinopathy in man, Dr. C. J. Radford has studied the behaviour of these cells in experimental animals. Dr. Hausler has continued to hold a clinic devoted to diabetic retinopathy at the Toronto Western Hospital.

Under a grant from the Defence Research Board, Dr. J. A. Parker and Mr. P. J. Foley have shown that asymmetry in fixation exists for the two eyes during horizontal saccadic version movements. Dr. E. C. Kris and Dr. Parker, in collaboration with Dr. Hausler, were able to demonstrate a diurnal variation in the corneo-fundal potential.

With the help of a grant from the Atkinson Foundation, Dr. D'Arcy Macdonald has continued his work on contact lens. This work is being done at a special contact lens clinic at the Toronto Western Hospital.

Besides the formally supported work, the staff has extended its studies in a number of fields. Dr. J. C. Hill has been conducting a programme on silicone for the

lubrication of artificial eyes. With Dr. C. J. Radford, he is also studying various uses of silicone in ophthalmic plastic surgery. Dr. M. Shusterman has initiated a clinical research on the surgical treatment of congenital nystagmus and an investigation of vitreous floaters. He has continued studies on retinal detachment in children, intra-ocular lenses for aphakia and catgut allergy in children. Dr. B. Teichman continued his interest in the problems of lacrimal drainage. He is also conducting research on anisometropia and AV syndrome. Dr. Teichman conducts an orthoptic clinic at the Toronto Western Hospital for studying strabismus cases. Under the direction of Dr. A. Lloyd Morgan, investigations on the cause and treatment of strabismus and on the treatment of congenital cataracts are continuing at the Hospital for Sick Children. Dr. J. S. Crawford is continuing research in treatment of ptosis. He and Dr. J. S. Speakman are also studying cases of congenital corneal oedema.

Dr. Lois A. Lloyd is continuing research into neuroophthalmological problems at Toronto General Hospital and the Hospital for Sick Children. Dr. G. A. Thompson has been working on the diagnosis of ocular tumours using radioactive phosphorus. Dr. W. P. Callahan, assisted by Dr. P. Forbath and Mr. W. Besser of St. Michael's Hospital, has developed new methods for determining the patency of the nasolacrimal duct.

PUBLICATIONS

- ANDERSON, D. L. and LLOYD, LOIS A. "Traumatic Lesions of the Optic Chiasma" (*Canadian Medical Association Journal*, vol. 90, no. 3, Jan. 18, 1964, pp. 110-5).
- BASU, P. K. Discussion on "Effect of Massive Radiation on the Eye" (*Transactions of the Canadian Ophthalmological Society*, vol. 25, 1962, pp. 257-9).
- FRENCH, R. C. and DUMA, Z. "Studies on Protein Metabolism of the Cornea: II, The Incorporation of C¹⁴ labelled Amino Acids into Components of the Rabbit Cornea" (*Canadian Journal of Biochemistry*, vol. 42, no. 1, Jan., 1964, pp. 111-20).
- HAUSLER, H. R., SIBAY, T. M. and CAMPBELL, J. "Retinopathy in a Dog Following Diabetes Induced by Growth Hormone" (*Diabetes*, vol. 13, no. 2, Mar.-Apr., 1964, pp. 122-6).
- HAUSLER, H. R., SIBAY, T. M. and STACHOWSKA, B. "Observations of Retinal Microaneurysms in a Metahypophyseal Diabetic Chinese Hamster" (*American Journal of Ophthalmology*, vol. 56, no. 2, Aug., 1963, pp. 242-4).
- "Observation of Retinopathy in Metahypophyseal Diabetic Chinese Hamsters" (*Investigative Ophthalmology*, vol. 2, no. 4, Aug., 1963, pp. 378-83).
- HILL, J. C. "Burns and Lacerations" (*Ophthalmic Plastic Surgery*, Course 29, 1963 Instruction Section, American Academy of Ophthalmology and Otolaryngology).
- "Ectropion" (*International Ophthalmology Clinics*, vol. 4, no. 1, March, 1964, pp. 95-112).
- MACDONALD, D'ARCY. "Aid for the Visually Handicapped" (C.N.I.B. Magazine *Our Rendezvous*, vol. 17, no. 1, winter, 1964, pp. 13-5).
- MACDONALD, R. K. (with Pierce, H.) and BASU, P. K. "Subscleral Implants and Chorioretinal Diathermy" (*American Journal of Ophthalmology*, vol. 56, no. 3, pt. 1, Sept., 1963, pp. 451-4).
- MCCULLOCH, C. "Hereditary Eye Diseases and Advice to Patients" (*The Field of Vision*, published quarterly by the Eye Health Service, vol. 18, no. 4, winter, 1963, pp. 1-4).
- MCCULLOCH, C. "Ocular Histoplasmosis" (*Canadian Medical Association Journal*, vol. 89, no. 25, Dec. 21, 1963, pp. 1270-3).
- "Ocular Histoplasmosis" (*Transactions of the Canadian Ophthalmological Society*, vol. 26, 1963, pp. 107-25).
- MCCULLOCH, C., THOMPSON, G. A. and BASU, P. K. "Lamellar Keratoplasty using Full Thickness Donor Material" (*Transactions of the American Ophthalmological Society*, vol. 61, 1963, pp. 154-80).
- MORIN, J. D., HILL, JOSEPH C., ANDERSON, J. E. and GRAINGER, R. M. "A Study of Growth in the Interorbital Region" (*American Journal of Ophthalmology*, vol. 56, no. 6, Dec., 1963, pp. 895-901).
- SABNIS, S. S. and BASU, P. K. "Antigens in Avascular Tissues" (*American Journal of Ophthalmology*, vol. 56, no. 2, Aug., 1963, pp. 229-32).
- SHEA, MICHAEL. "The Management of Retinal Detachment" (*Transactions of the Canadian Ophthalmological Society*, vol. 25, 1962, pp. 228-44).
- "The Use of Silicone in Retinal Detachment Surgery" (*ibid.*, vol. 26, 1963, pp. 63-78).
- SIBAY, T. M., BASU, P. K. and MACDONALD, R. K. "An Operating Platform for Animal Eye Surgery" (*American Journal of Ophthalmology*, vol. 57, no. 3, March, 1964, pp. 482-4).
- SPEAKMAN, J. S. and LEESON, T. S. "Pathological Findings in a Case of Primary Congenital Glaucoma Compared with Normal Infant Eyes" (*British Journal of Ophthalmology*, vol. 48, no. 4, April, 1964, pp. 196-204).

OTOLARYNGOLOGY

Under the direction of Professor P. E. Ireland

The undergraduate teaching of this special branch of Medicine requires our first consideration since we are a Department in the University of Toronto. One must consider, however, that there are major problems in Medicine which are of more concern to the larger departments of Medicine, Surgery, and Obstetrics and Gynaecology. The licence to practise in the various provinces is listed for Medicine, Surgery, and Mid-Wifery, and the examination of the Medical Council of Canada aimed at these three divisions. In order to have a broad knowledge of the practice of Medicine, the various lesser specialties must be adequately taught to the students in order that they may carry on a successful General Practice in any locality which they choose. The time schedule in all undergraduate teaching must be carefully considered in the light of the increasing knowledge of Medicine. It is not thought possible to allot more teaching time to any of the specialties such as Otolaryngology. This has posed the question of presenting more of the new developments in each specialty in a more concentrated form in order that the undergraduate may have an adequate knowledge to proceed in the consideration of his particular problems. This has further made necessary the careful consideration of what is essential to teach to this undergraduate group. A series of condensed notes have been prepared and these are made available to each individual student in an attempt to put forward the material which is felt to be of the most help in their training. The course of lectures and clinics have also been revised to bring them to a more useful level of service to this group of undergraduate students.

The graduate teaching programme is continuing and the number of students has been increased from the previous year. It is gratifying that there are a large number of applications and that we are able to choose from a better group for this course. The general shortage of specialists in Otolaryngology throughout Canada makes this a most important training Centre to supply specialists in this particular area. This course is given by the University of Toronto and includes instruction from many Departments outside of that of Otolaryngology.

The question of continuing education involves our Department as well as most of the Departments in the Medical School. This consists of helping in various post-graduate courses which are presented to the general practitioners and to Specialty Units. In the coming year we are presenting two courses, one of which is to the general practitioner in his problems in Otolaryngology and the other to specialists in this subject. All of these require a considerable amount of time on the part of our staff who are only on an honorarium basis and it is hoped that this may be remedied by the plans which are being formulated for the future of the whole Medical Faculty.

The Head of the Department wishes to thank all the staff for the cooperation he has received during the past academic year. It is only through their support that we are able to feel each year an improvement is being made in all branches of our teaching and research. One must also extend our gratitude to the Research Fellows and technical staff and to our secretaries who are associated in all the details of administration.

RESEARCH

Medical and basic research has continued to be of increasing interest in this Department. The aid of many research grants has enabled us to employ numerous scientists interested in the basic part of our problems. In this regard I would like to mention as a member of our staff, Dr. Walter Johnson, who has been established as the overall advisor in Research in our various activities. Dr. Johnson is also an employee of Defence Research Medical Laboratories so that the work which is being done with regard to the problems of vertigo and disorientation has been correlated

through his attachment there and the various problems which we are in the process of investigating in the University Department. This entails a further connection with the American Space Administration to which Dr. Johnson is an advisor. Its correlation involves all research projects including the one under the Department of National Health and Welfare grant to St. Michael's Hospital, the Hartford Foundation grant to the Toronto General Hospital, the grant from the Alcoholism and Addiction Foundation to the Department, and the combined grant of the Defence Research Board to the Department of Physiology and Otolaryngology. We should include also a very generous grant from the National Institutes of Health, Washington, for the study of an affiliated basic problem in the function of the labyrinth, together with a grant from the Medical Research Council of Canada for partial support of this study.

We are most fortunate in having Professor Gosta Dohlman of Lund and Stockholm, Sweden, in our laboratories as a Visiting Scientist who is supported by the National Institutes of Health, Washington. His work on the investigation of Secretion and Absorption of the Endolymph involves the use of the electron microscopes which are now supplied in the Banting Institute. He has a wide experience in basic research in the labyrinth and his experimental findings have been expressed in meetings held in both Greece and Germany. He also gave an important paper at the American Otological Society Meeting in San Francisco in April. I am, in fact, most grateful to the United States Government for the support of this work and to Dr. Dohlman in that he has picked Toronto as the area in which he wishes to conduct his experimental studies.

Dr. Joseph Farkashidy has completed his five-year grant from the Medical Research Council but has continued on a further grant in order that he may work with Dr. Dohlman on the problem with which he is involved. He is also further committed to clinical research by the grant to the Toronto General Hospital from the Hartford Foundation.

The National Health grant to St. Michael's Hospital has been continued and under it Dr. Elizabeth McKee has continued to study the clinical causes of vertigo and the relationship to the diagnosis of the various medical problems which they involve. This work is under the direction of Dr. G. Arnold Henry, Chief of Otolaryngology at St. Michael's Hospital.

Dr. Yuichi Nito continued under a generous grant from the Alcoholism and Addiction Foundation to find and assess the effect of alcohol on the human and animal vestibular function. He has produced two papers which are now in the process of publication and which will be most useful in this problem. He is to continue under another grant to find and isolate the vestibular nuclei and to endeavour to map out the function of these nuclei as well as those of certain parts of the cerebellum. This will be a most useful contribution to the basic science problem of vertigo.

Dr. T. D. R. Briant is continuing under a grant from Defence Research Board in an effort to map the pathways of hearing and vestibular impulses from the peripheral region of the hearing and vestibular areas in the internal ear. He has also accepted the problem of hypophysectomy by the transphenoidal method of approach. This is a useful operation from the point of view of limiting secondaries in carcinoma of the breast and of extirpation of primary tumours of the hypophysis. Experimental work is being done on this latter subject. He has added to the operative technique the use of the image intensifier in the operating room which is a great step forward in the procedure for the removal of this gland.

We cannot ignore in this report the interest Dr. J. A. Sullivan has taken in this Department. As the former Chief of Otolaryngology at St. Michael's Hospital and Assistant Professor, he is one of the mainstays of our Department. We do, however, consider him still a part of our organization in that he is always available for advice and support. He has continued to do clinical medicine and has presented papers from departmental material. He is on the Council of the American Triological Society and is Past-President of the American Otological Society. At the First British Academic Conference in Otolaryngology during 1963 in London, England, he pre-

sented an excellent paper on Stapes Surgery. He was accompanied this time by Dr. Walter Johnson who presented a paper on vertigo. We are very proud that Dr. Sullivan continues to have an interest in our specialty and that he has been a great help with our graduate teaching and our research endeavours. He also accompanied Dr. Walter H. Johnson to Basle, Switzerland last June when Dr. Johnson presented a lecture on vestibular testing to this University in Switzerland.

I do not think that we should ignore the fact that certain grants have been given to various hospitals which involve the use of University personnel. This is true of the National Health and Welfare grant to St. Michael's Hospital and also a generous grant from the Hartford Foundation to the Toronto General Hospital. While these are not true University funds and are administered by the hospital, they involve the use of University personnel in the performance of the research which is of a clinical nature. The Hartford Foundation grant to the Toronto General Hospital is one which might be most important from a clinical research point of view. We must also take into account the various generous contributions which the Board of Trustees of the Toronto General Hospital have made in establishing equipment for a Vestibular Unit in their hospital which is not to be considered secondary to any Unit which may be established elsewhere. In this investigation under Dr. Hugh Barber and Dr. Walter Johnson we have included also the help of Dr. Yuichi Nito and Dr. Joseph Farkashidy who are both on the University staff. The clinical investigation is very similar to that under the Health grant to St. Michael's Hospital which involves the treatment and investigation of patients who are subject to vertigo as a symptom. I would think that this points out the cooperation which must be necessary in bringing the University into the area of clinical research which is, in effect, a problem which must involve the hospitals. This requires the spending of a considerable amount of money for equipment and for services which only the hospital can supply but which must surely involve the use of University personnel. It is now in full operation and should produce clinical material which will be invaluable from a point of view of useful service in the treatment of the patient.

There is a further consideration of support for clinical investigation which comes from the funds which we have received from Mr. E. C. Fox, a former Chairman of the Board of Trustees of the Toronto General Hospital. In this research we have had help for the investigation in the assessment of hearing in infants and small children with hearing defects. This has consisted of the use of E.E.G. in an investigation of these cases which has been conducted largely in the Toronto General Hospital with the cooperation of Dr. John Scott of the Department of Physiology and of the E.E.G. Department in the Toronto General Hospital. In this Dr. Shirley Appleby and Dr. W. S. Goodman have developed a means of testing small babies and infants with regard to hearing. It is most important that these children be investigated early and any defect in hearing found in the early months of life in order that they can be helped and speech can be developed in the children who are deaf. This has involved international support from Dr. Hallowell Davis of St. Louis of the Institute for the Deaf and many people throughout the American Continent. We do feel that we can now find the babies who are deaf by this method of investigation and that these infants can be given suitable treatment and can be taught speech. This is a great international problem which has been considered by many people throughout the world and it is a great effort to be able to assess these children and to treat them before they reach the stage when treatment may not be effectual. In this we have had the cooperation of the Hospital for Sick Children and I might mention in this regard that Dr. J. B. Whaley and Dr. Page Statten have taken a great interest. We are very grateful for the money which has been made available by Mr. Fox for this research and also to the Atkinson Foundation Grant for the training scheme at the Children's Hospital in order that we can continue this work. This fall a meeting is being held in Toronto of the leading scientists from all over the world, to discuss this problem and to assess where we might find a solution. This is again through the generosity of Mr. Fox to whom we are most grateful for the establishment and the financing of this meeting.

I am sure this is a real step forward in the treatment of deaf children and of the so-called deaf mute, who make up a considerable number of our population.

In addition to the published papers which are listed, a number of the staff have also presented papers which are in press for publication. At the conjoint meetings of the Specialty Societies, four papers were presented by members of the staff of Otolaryngology. These were by: Professor DOHLMAN and Dr. H. O. BARBER at the American Otological Society, Dr. W. S. GOODMAN and Dr. H. O. BARBER at the American Triological Society, and Dr. BLAIR FEARON at the American Broncho-Esophagological Society. At the Canadian Otolaryngological Society Meeting in June of this year papers were presented by Dr. D. SNELL and Dr. Ian MACMILLAN, Dr. T. D. R. BRIANT, Dr. Shirley APPLEBY, Dr. W. S. GOODMAN, and Dr. W. S. RUMBALL. Dr. IRELAND presented a paper at the Interstate Postgraduate Medical Association Meeting in Chicago on "Symptoms and Treatment of Hoarseness," and also a paper on "Headache in Relation to Otolaryngology," at the Ontario Medical Association Annual Meeting in Toronto in May. Dr. H. O. Barber's thesis on "Positional Nystagmus as Related to Head Injury," was given the Mosher Award by the Triological Society at their Annual Meeting in San Francisco.

PUBLICATIONS

- APPLEBY, S. "E.E.G. Audiometry—Preliminary Report" (*Bulletin of the Academy of Medicine*, vol. 37, no. 7, April, 1964, pp. 121-2).
- BRIANT, T. D. R. "Trans-Sphenoidal Hypophysectomy" (*Bulletin of the Academy of Medicine*, vol. 37, no. 5, Feb., 1964, pp. 77-83).
- BRYCE, D. P. "Carcinoma of the Larynx: Results of Therapy" (*Canadian Medical Association Journal*, vol. 90, no. 13, March 28, 1964, pp. 757-61).
- BRYCE, D. P., IRELAND, P. E. and RIDER, W. D. "Experience in the Surgical and Radiological Treatment in 500 Cases of Carcinoma of the Larynx" (*Annals of Otology, Rhinology and Laryngology*, vol. 72, no. 2, June, 1963, pp. 416-30).
- DOHLMAN, G. F. "Der Endolymphund Blutkreislauf des Inneren Ohres"; in *Vegetative Funktionen des inneren Ohres (Labyrinth)*, pp. 554-71. Stuttgart: Hippokrates-Verlag. 1963.
- FARKASHIDY, J. "Clinical and Histopathological Studies in Ototoxic Antibiotics" (*Proceedings of the Canadian Otolaryngological Society*, vol. 17, 1963, pp. 131-41).
- FARKASHIDY, J., BLACK, R. G. and BRIANT, T. D. R. (by invitation) "The Effect of Kanamycin on the Internal Ear: An Electrophysiological and Electron Microscopic Study" (*Laryngoscope*, vol. 73, no. 6, June, 1963, pp. 713-27).
- FEARON, B. and MACDONALD, R. E. "The Surgical Management of Spontaneous Pneumomediastinum in Children" (*Proceedings of the Canadian Otolaryngological Society*, vol. 17, 1963, pp. 32-42).
- FEARON, B. and SHORTREED, R. "Tracheobronchial Compression by Congenital Cardiovascular Anomalies in Children" (*Annals of Otology, Rhinology and Laryngology*, vol. 72, Dec., 1963, pp. 949-69).
- IRELAND, P. E. "Presidential Address" (*Proceedings of the Canadian Otolaryngological Society*, vol. 17, 1963, pp. 3-6).
- SMITH, J. B. "The Management of Facial Nerve Paralysis" (*Proceedings of the Canadian Otolaryngological Society*, vol. 17, 1963, pp. 43-53).
- SMITH, J. B. and JOHNSON, W. H. "Direct Nerve Stimulation of the Components of the Non-Auditory Labyrinth of the Cat" (*Annals of Otology*, Dec., 1963, pp. 1102-8).

PAEDIATRICS

Under the direction of Professor A. L. Chute

One of the major events of the year has been the opening of the new Gerrard Street wing. It has provided for a marked increase in space for research including animal facilities. This includes a primate colony for the smaller domestic farm animals as well as the traditional laboratory animals such as rats, dogs, or cats.

The enlarged accommodation for premature and newborn care includes a well-equipped unit for the intensive study of newborn disorders. For study in the field of respiratory and cardiac problems in these small infants, an impressive array of x-ray and electronic recording apparatus has been provided.

Cardiology has obtained its much needed expansion in space to meet the growing needs for study and treatment of cardiac disease in children. Provision is also made for a laboratory to study respiratory problems of older children. A nine-bed, self-contained, clinical investigation unit provides services for the most complicated studies.

Electroencephalography, speech therapy, and dentistry are sumptuously provided for even though they reside in the basement.

This partial listing does not even mention the numerous other services, operating room, nursing school, etc., which are accommodated in the building. It is our hope that the excellence of the facilities provided will be matched by the service rendered to the public and the productivity of our laboratories.

In the past year teaching duties have been separated from ward responsibility. This change has gained the approval of both teachers and students. The major step in our re-organization for teaching, namely the formation of a clinic to include all patients of the teaching staff both private and public, will be completed and put into effect on July 1. It is hoped that this far-reaching step will not only insure an adequate volume of patients for clinical teaching in the future but will improve the co-ordination and improvement of services to the patients. One trusts it will promote increased participation through discussion at all levels between staff man and resident and among the general paediatrician, the specialist, and the research worker. If it does so, the aim of providing teaching in an atmosphere of the best of medical care will be achieved.

The exchange programme with the University of the West Indies in Jamaica has proved highly beneficial to both Departments. Dr. Back from Jamaica was a Visiting Professor in our Department for a period of six weeks in the early fall. Drs. Ebbs, Laski, Prichard, and Turner made significant contributions to the teaching programme in Jamaica during the winter term.

Two young Jamaicans will be coming to the hospital to take up residencies in Paediatrics for the coming year. This project has been financed entirely by a fund created by the paediatricians on the hospital staff.

In addition, we have continued to give training in Paediatrics to a number of Colombo Plan physicians from Indonesia and Malaya.

After many years of most active and devoted service, Dr. Nelles Silverthorne retires from the teaching staff this year. His interest in medical missions will probably take him on a teaching tour around the world.

Dr. Richard Hamilton will be joining our research staff having obtained a Medical Research Council Fellowship for the study of gastrointestinal disorders in childhood.

Other Fellowships awarded to our residents are: Dr. Dent, Queen Elizabeth II to study immunological mechanisms with Dr. Robert Good of Minnesota. Dr. Laberge, Queen Elizabeth II to study human genetics with Dr. McKusick at Johns Hopkins University. Dr. Wolfish, Medical Council Fellowship to study renal disorders with Dr. Yendt at Toronto General Hospital.

RESEARCH

Allergy. Dr. Collins-Williams is continuing his investigations on milk allergy.

Fibrocystic disease. Dr. Crozier is evaluating the new penicillins in controlling the respiratory infections of fibrocystic disease.

Newborn. Dr. Swyer is continuing his studies on assisted respiration in the newborn. He is also making a study of the load of work imposed by respiratory distress. Studies in control of respiratory and metabolic acidosis are being continued. Experimental animals subjected to continuous exchange transfusion to maintain oxygen requirements and CO₂ elimination are under investigation with a view to possible clinical applications. Dr. W. H. Johnston and Dr. Robert Johnson are conducting a five-year, follow-up study on erythroblastosis.

Metabolic. Dr. Donald Fraser has continued to study problems relating to various types of rickets in children. Working with Dr. Patrick Conen and a Research Fellow, Dr. Luc Paunier, Dr. Fraser has carried out careful assessment of the renal function and morphology in patients who for long periods have received very large doses of vitamin D for the treatment of vitamin D-refractory rickets. So far, no cases of renal impairment have been observed. In another study carried out jointly with Dr. Charles Scriver, Jr. of McGill University, Dr. Donald Fraser and Dr. Sang Whay Kooch have studied the incidences of hyperaminoaciduria in vitamin D deficiency. Their evidence so far suggests that this not uncommon phenomenon is caused by secondary hyperparathyroidism but is modified also by the serum calcium concentration.

It was discovered in a clinical, follow-up study of rickets that there was a very significant incidence (approximately 33 per cent) of premature fusion of one or more cranial sutures as a result of the previous rachitic disturbance. It was further observed that this phenomenon occurred independently of the specific pathogenesis of the child's rachitic lesions, whether due to refractory rickets or to vitamin D deficiency. This unexpected finding is being investigated in experimental animals.

Dr. Sass-Kortsak has continued his studies on the metabolic activity of copper and copper-binding proteins. With Dr. Aspin, he has developed a technique for total body scanning after giving a tracer dose of radioactive copper. He has also continued, with the help of Dr. L. Naiman, studies on the metabolic activity of the red blood cells.

Cardiology. Dr. Fowler is studying the electrocardiographic changes associated with aortic stenosis. Dr. J. Keith has done studies in the pathology, abnormal physiology, modes of therapy and prognosis of congenital heart disease, and also studies in rheumatic fever.

Haematology. Dr. P. McClure is doing a study of thrombopoiesis in Idiopathic Thrombocytopenic Purpura and also a study of osmotic fragility of platelets in haemophilia carriers.

Virology. Dr. D. McLean has been working on several research projects. They are: (1) ecology of Powassan virus; (2) morphology of Powassan virus; (3) continuing evaluation of preventive effect of mumps vaccine following exposure of susceptible contacts to mumps; (4) dissemination of viruses by water and air; (5) continuing prospective study of effect on offspring of rubella, measles, respiratory, and other viral infections in pregnancy.

Neurology. Dr. Prichard has continued his studies on the possible association of experimental neonatal hypoxia with altered calcium and phosphorus metabolism and brain damage. He is working on the analysis of electroencephalograms in the newborn in the prognosis of seizures.

Genetics. Dr. T. E. Reed has completed a research project on blood groups and reproduction begun in 1958. He is continuing research on minor populations of red blood cells. He is also doing a new study of blood groups and natural selection.

Dr. Margaret Thompson with Dr. E. G. Murphy is doing a study in genetic problems in muscular dystrophy. She is also studying genetic anaemias in mice in cooperation with Biological Research Division, Ontario Cancer Institute.

PUBLICATIONS

- CHUTE, A. L. "Lecture on Medical Education" (*Camsi Journal*, vol. 22, no. 2, April, 1964, pp. 26-32).
- COLLINS-WILLIAMS, C. T. "Allergic Purpura"; in *The Allergic Child* by F. Speer, pp. 192-9. New York: Hoebar Press. 1963.
- "Eczema and Gastrointestinal Allergy"; in *Current Pediatric Therapy* by S. Gellis and B. Kagan, pp. 604-8. Philadelphia: W. B. Saunders Company. 1963.
- "Gastrointestinal Allergy in Infancy and Childhood"; in *Somatic and Psychiatric Aspects of Childhood Allergies* by E. Harms, pp. 143-52. Oxford: Pergamon Press. 1963.
- "Urticaria and Angioedema"; in *The Allergic Child* by F. Speer, pp. 174-91. New York: Hoebar Press. 1963.

- EHRlich, R. M. *et al.* "Immunologic Assay of Insulin in Plasma of Children" (*Journal of the American Diabetes Association*, vol. 13, no. 2, March-April, 1964, pp. 177-81).
- FOWLER, R. S. "Accidental Digitalis Intoxication in Children" (*Journal of Pediatrics*, vol. 64, Feb., 1964, p. 188).
- "Drugs for Rheumatic Fever" (*Canadian Medical Association Journal*, vol. 90, no. 22, May 30, 1964, p. 1269).
- "Office Assessment of Heart Murmurs in Children" (*Journal of the College of General Practice*, vol. 10, no. 5, March, 1964, pp. 41-2).
- FRASER, D. "Treatment of Vitamin D Deficiency Rickets" and "Treatment of Vitamin D-refractory Rickets"; in *Current Therapy* by H. F. Conn, pp. 315-18. Philadelphia: W. B. Saunders Company. 1964.
- HANLEY, W. B., BRAUDO, M. B. and SWYER, P. R. "Neonatal Respiratory Distress: Experience at the Hospital for Sick Children, Toronto, 1960-61" (*Canadian Medical Association Journal*, vol. 89, no. 9, Aug. 31, 1963, pp. 375-81).
- HAWKE, W. A. and MCGREAL, B. A. "Tranquilizers" (*Clinical Pediatrics*, vol. 3, no. 4, April, 1964, pp. 192-6).
- KEITH, J. D. "Rheumatic Heart Disease: A Clinicopathologic Conference" (*Pennsylvania Medical Journal*, vol. 66, 1963, p. 20).
- MCKENDRY, J. B. J. "Enuresis: A Three-year Study of the Value of a Waking Apparatus" (*Canadian Medical Association Journal*, vol. 90, no. 8, Feb. 22, 1964, pp. 513-6).
- "Jaundice in the New Born Infant" (*Clinical Pediatrics*, vol. 3, no. 4, April, 1964, pp. 209-14).
- MURPHY, E. G. *The Chemistry and Therapy of Disorders of Voluntary Muscles*. Illinois: Charles C. Thomas. 1964. Pp. 123.
- "Neuromuscular Disorders"; in *A Manual of Paediatrics* by P. Robinson and A. Walgren, pp. 449-54. India: Orient Longmans. 1963.
- PRICHARD, J. S. "Epilepsy in Children"; in *Current Therapy* by H. F. Conn, pp. 520-3. Philadelphia: W. B. Saunders Company. 1964.
- PRICHARD, J. S., GAUK, E. W. and KIDD, L. "Mechanism of Seizures Associated with Breath-Holding Spells" (*New England Journal of Medicine*, vol. 268, June, 1963, pp. 1436-41).
- PRICHARD, J. S. *et al.* "Myasthenia Gravis"; in *Current Paediatric Therapy* by S. Gellis and B. Kagan, pp. 420-2. Philadelphia: W. B. Saunders Company. 1964.
- REED, T. E. "The Frequency and Nature of Blood Group A_s" (*Transfusion*, vol. 3, 1964, p. 429).
- Review, *American Journal of Clinical Pathology*, vol. 41, no. 1, Jan., 1964, p. 94.
- THOMPSON, M. W. *et al.* "Response of Polycythemic WW^v Anemic Mice to Erythropoietin" (*Proceedings of XI International Congress of Genetics*, vol. 1, 1963, p. 185).

PATHOLOGICAL CHEMISTRY

Under the direction of Professor J. A. Dauphinee

During the session 1963-64 133 undergraduate students attended the lectures and laboratory classes in Pathological Chemistry given in the third year of their medical course. In the undergraduate lectures the various changes in the function of tissues and organs and the resulting alterations in body chemistry and the clinical consequences which may be encountered in various diseases are discussed in as much detail as possible, paying particular attention to the nature of the responsible basic and underlying mechanisms. The subjects covered in the lecture course include water, electrolyte, and acid-base metabolism; the causes and results of disturbances in renal function; the derangements of carbohydrate metabolism; the causes of hepatic disease and the various pathological mechanisms associated with the occurrence of jaundice and of other abnormalities of bile pigment metabolism; protein metabolism in disease; disturbances in gastrointestinal function and a discussion of the various hormones and endocrinopathies which is given in as comprehensive a manner as our limited number of lectures will allow. Changes in lecture content and emphasis are continually being made in the light of the rapidly expanding knowledge of fundamental biochemistry on the one hand and the swift advancement of clinical science on the other. During the present year the subject of immunochemistry and the relation of immunochemical reactions to various disease processes was introduced by Professor Cinader. In the laboratory classes the work of the students follows the

lecture course as closely as possible. Much use here is made of the "case method" of study which has been described in previous reports. It is believed that this method of approach gives the students the best opportunity to correlate the clinical history and physical findings of a particular disease with the various biochemical abnormalities which are to be found in a particular individual patient. Small group teaching is being used more and more and during the past year the number of small group seminars, in which the students, under the charge of a Teaching Fellow or Demonstrator, present their cases and discuss the biochemical and physical findings, has almost doubled. Considerable guidance in introducing certain changes and modification in our course has come from a study of the results of an annual questionnaire completed by our students at the end of each year, in which they are invited to comment about various aspects of the course and about the presentation of the subject.

In our Graduate Department some 11 students were registered with the School of Graduate Studies: 7 for Ph.D. degree, 3 for the M.A. degree and 1 was taking a minor for his Ph.D. degree in Physiological Hygiene. In addition to these, 4 others were registered with the Faculty of Medicine for the B.Sc.(Med.), 2 of whom are now in the third year of the recently introduced three year summer course for this degree. Two of our graduate students have completed their Ph.D. requirements during the current session and have been granted their degrees by the School of Graduate Studies. The graduate course in Clinical Chemistry (Course 1005 in the Calendar of the School of Graduate Studies) which has been organized by Professor Porter and Dr. Dianna Schatz of the Biochemistry Laboratory of the Toronto General Hospital has become well established. This course consists of 90 hours of lectures, demonstrations, and class exercises in clinical chemistry and biochemistry. Part I of the course (10 3-hour sessions) was devoted this year to the theory of measurement, the principles of analytical chemistry most relevant to the practice of clinical chemistry, and to the principles and techniques of modern instrumental analysis. Part II of the course (20 sessions) was devoted to a critical consideration of current methods used to measure various biochemical constituents of body fluids. The general chemistry, biochemistry, and metabolism of proteins, fats, carbohydrates, electrolytes, and bile pigments was reviewed and problems of interpretation of laboratory results were discussed in terms of the precision and accuracy of answers obtained by different procedures (quality analysis and quality control). The course was attended by 7 graduates in Medicine of whom 6 were proceeding to certification in Clinical Pathology and 1 was taking a Ph.D. minor in Pathological Chemistry, and by a number of other persons who were candidates for the Diploma in Medical Technology.

Professor William Paul has continued to organize and direct the very successful two and one half week course on Radioactive Isotopes which has now been given annually for eight consecutive years by the Division of Postgraduate Medical Education of the Faculty of Medicine. Using both lectures and laboratory exercises, this course deals with the techniques and mathematics associated with the clinical uses of radioactive isotopes, with the biological effects of radiation, and with the tracer—diagnostic and therapeutic applications of these materials. The number of student places available, previously 20, has now been increased to 30, and the course has regularly been oversubscribed. Successful completion of this course fulfils, in part, the requirements demanded by the Department of National Health and Welfare, for those who wish to use radioactive isotopes in the investigation or treatment of human patients.

The senior members of the Department have also taken an active part in a number of other courses put on by the Postgraduate Medical Division of the Faculty of Medicine, including the "Five O'Clock Lecture Series for Internes" at the Toronto General Hospital, "The Use of Laboratories in the Practice of Medicine," "The Postgraduate Course in Endocrinology and Metabolism," and also, of course, the six weeks advanced graduate courses in Medicine, Surgery, and Obstetrics and Gynaecology.

cology, given in the late summer and early autumn of each year for Fellowship candidates and others.

The leave of absence of Dr. T. Frederick Nicholson, referred to in last year's report, was renewed in order to permit him to continue the development, which he began last year, of the Department of Pathology in the new University of Lagos Medical School in Nigeria. During his absence from Toronto much of his teaching duties have been taken over by Dr. A. DeWitt Baines who has been appointed Lecturer. Associate Dr. S. H. Jackson and Lecturer Dr. C. J. Porter, both of whom are taking an increasingly active part in our undergraduate and graduate teaching programme, have been promoted to the rank of Assistant Professor. Our interest in the immunochemical aspects of disease has been strengthened by the appointment of Dr. S. Dubiski to our Department as Research Associate. Formerly an Associate Professor of Microbiology in Poland, Dr. Dubiski has recently worked closely with Professor Cinader and has had much experience in serology and immunochemistry. He is now developing an Immunochemistry Laboratory at the Toronto Western Hospital. Of our more junior teachers in the Laboratory an attempt is made to divide them fairly evenly between those who are, on the one hand, medically qualified and keenly interested in Pathological Chemistry, and those, who, on the other, are trained biochemists interested in human disease. This is done in an attempt to ensure as sound teaching as is possible, not only in the clinical and pathological aspects of our subject but also in the understanding of the nature of the underlying basic disturbances in biochemistry which occur in the sick human patient.

Professor GORNALL was invited to participate in the "International Symposium on Angiotensin, Sodium and Hypertension," held at Ste Adele-en-Haut, Quebec, and to present a paper entitled "Effects of Aldosterone and Other Adrenal Hormones on the Blood Pressure Responses to Renin and Angiotensin." Other lectures presented outside the University during the year by members of the staff include the following: J. A. DAUPHINEE: "Chemical Features of Hepatitis" at the Symposium on "The Liver and Anaesthesia" Canadian Anaesthetists' Society, Toronto; on "The Metabolism of Copper with Particular Reference to the Aetiology and Treatment of Patients with Wilson's Disease" at the University of Western Ontario. Miss MARGARET S. DEWOLFE: "Serum Alpha-2 Globulins" at the Symposium on "Proteins, Genes, and Evolution," Toronto. A. G. GORNALL: "Adrenal Steroids" at the University of Western Ontario. W. PAUL: "Design and Function of a Brain Scanner for Routine Investigation" at the International Atomic Energy Agency, World Health Organization Symposium on "Medical Radioisotope Scanning," Athens, Greece. C. J. PORTER: "Quality Control in Clinical Chemistry, I. A Description of an Inter-medical Laboratory Quality Analysis Survey" presented at the Fifth International Congress of Clinical Chemistry, Detroit, Michigan; on "Quality Analysis and Quality Control in the Laboratory of the Future," an invited paper presented at the Catholic Hospital Association Institute on "Quality Analysis, Quality Control, and Automation in the Clinical Laboratory," Chicago, Illinois; "Determination of Calcium in Serum and Urine by Atomic Absorption Spectrophotometry" presented at the Seventh Annual Meeting of Canadian Society for Clinical Chemistry, Toronto; "Automation in Clinical Chemistry" presented at the Fifteenth Annual Meeting of the Ontario Society of Medical Technologists, Toronto. Barry A. TOBE: "The Role of Drugs in the Pathology of Hepatic Encephalopathy" presented at the International Association for the Study of the Liver at Louvain, Belgium.

RESEARCH

Reported by Professor J. A. Dauphinee

The Head of the Department wishes here to make grateful acknowledgment to the Canadian Medical Research Council, the Ontario Heart Association, and the Ontario Cancer Treatment and Research Foundation for the generous grants-in-aid which

have been made to all the senior members of our staff. These, in large measure, have paid for the cost of many of the various research projects which are being carried on in the Department and particularly of those described below by Professor Gornall and Professor Paul.

In association with Professor J. C. Richardson and other members of the Neurological Staff of the Department of Medicine and the Toronto General Hospital, Mr. C. E. Downs and Dr. J. A. Dauphinee have continued their follow-up biochemical and clinical studies of our four patients with Wilson's disease who are under long term therapy with the chelating agent penicillamine, and they have also investigated the copper metabolism of a considerable number of other patients with neurological manifestations like those of Wilson's disease. Mr. B. F. Sakran, one of our B.Sc. (Med.) students, now in the third summer of his course, has been studying by high voltage electrophoresis and paper chromatography the effects of penicillamine on the urinary excretion and clearance of amino acids in these patients suffering from hepatolenticular degeneration and also in those having other types of hepatic disturbance. With Dr. Spaulding and others in the Department of Medicine, Dr. Dauphinee has continued his clinical studies of patients with cirrhosis of the liver and of the usefulness of different diuretics, both singly and in combination, and of other procedures in the treatment of ascites in the cirrhotic patient. Mr. L. A. Wright, who began his research programme under the direction of Professor T. F. Nicholson before the latter went to Nigeria, has been studying the effect of renal tubular damage on the clearance of amino acids by the dog kidney. He completed his thesis entitled "The Renal Handling of Amino Acids and other Amino Compounds in the Dog" and the other requirements and was awarded his Ph.D. degree at the June 1964 Convocation. He has accepted a position as Research Biochemist with the Montreal General Hospital. Dr. A. DeWitt Baines, who also began his research under Professor Nicholson, has extended his studies of the structure and function of regenerating renal tubules in the rat kidney and has reported on some of his findings at the June 1964 Meeting of the Canadian Physiological Society in Halifax. Dr. Levers, in association with Dr. W. Kerr of the Department of Surgery, has applied the technique of thin layer chromatography to the study of the urinary excretion of amino acids in patients with carcinoma of the bladder and other conditions with particular reference to the potentially carcinogenic metabolites of tryptophan. Miss Amy Britton, assisted by Drs. C. Ezrin and Robert Volpé of the Department of Medicine, has continued her studies of the serum protein binding of the thyroid hormones and has evolved a method using starch gel electrophoresis for the measurement of radioactive iodine labelled hormone bound to the individual protein fractions.

Working with Dr. S. H. Jackson, Miss Margaret S. DeWolfe has made an extensive study in health and disease of the slow α -2 macroglobulin protein component of the blood serum in rats and in children using starch gel electrophoresis, column chromatography, immunochemical, and immunoelectrophoretic procedures. She completed her thesis entitled "Immunochemical Mechanisms in Disease with Special Reference to Alpha-2 Macroglobulins," as well as the other requirements for the Ph.D. and was awarded her degree at the fall Convocation of the University in 1963. She has recently been appointed Assistant Professor of Paediatrics and Lecturer in Biochemistry at Dalhousie University where she will continue her research into the abnormalities of serum proteins in disease using techniques which she developed as a graduate student. Miss Florence Brown, also working with Dr. Jackson, has been using immunochemical and other procedures to investigate the different proteins in the urine in the various types of proteinuria and has developed methods for the quantitative determination in urine of albumin, 7-S γ globulin, and transferrin.

In Dr. Cinader's immunochemistry laboratory at the Ontario Cancer Institute, Dr. C. T. Chou has been studying the conditions under which newborn rabbits can be induced to produce antibodies. It is a pleasure to note that Dr. Chou has again

been awarded one of the W. P. Caven Memorial Fellowships. Mr. J. St. Rose also working with Dr. Cinader has been investigating the effectiveness of different amounts of chemically modified native protein in bringing about the termination of acquired immunological tolerance to the unmodified antigen.

Working with Dr. C. J. Porter, Mr. K. Wong has been studying the starch gel procedure for the separation of the isozymes of certain serum enzymes in an effort to determine whether or not this technique can be of help in determining the source of origin of a particular serum enzyme.

The Stuart Alan Hoffman Memorial Prize, established in 1960 through the generosity of Mr. and Mrs. H. Hoffman in memory of their son, and given each year to a graduate student in the Department of Pathological Chemistry who has shown special ability in the field of research, has been awarded this year to Mr. Daniel Ostrovsky, M.S.A. (U.B.C.). Working with Professor Gornall, Mr. Ostrovsky has been engaged in investigating the various factors which control blood pressure and particularly those which influence the response to angiotensin, and he has made a substantial contribution to knowledge in the very complex field of cardiovascular reactivity.

Reported by Professor A. G. Gornall

Our research endeavours in the field of hypertension have been extended by the work of the following graduate students.

Mr. D. Ostrovsky has continued to study the effects of aldosterone and other adrenal hormones on the vascular responses of rats to various pressor substances. Desoxycorticosterone and a high salt diet enhanced the blood pressure responses to both renin and angiotensin before the animals became hypertensive. Different results were obtained with other pressor agents. The presence of adequate circulating levels of aldosterone appears to be necessary for normal responses to angiotensin. Changes in vascular reactivity have been observed in pregnant rats, renal hypertensive rats, and in adrenalectomized rats with and without hormone therapy. Mrs. H. Pavuls has provided technical assistance with this problem; Mr. G. L. Weisbrod has joined the project as summer student assistant.

Mrs. B. J. (Grange) Cadeau has measured the radioactivity of rat tissues after the injection of tritiated aldosterone. Liver, kidney, adrenals, lung, salivary gland, red cells, and possibly aorta appear to have a special affinity for the hormone.

Dr. Carol A. Cowell has made a number of improvements in our method for measuring angiotensinogen in plasma and has clarified many of the factors affecting dilution concentration relationships. With the assistance of Mrs. J. Grant, the changes in concentration of this renin substrate have been studied under a variety of circumstances.

Mr. M. King, in his second summer of a B.Sc.(Med.) programme, began a study of angiotensinogen levels during pregnancy in the rat. This is being extended to adrenalectomized animals maintained on different steroids. Miss S. Kovacs has begun a study of angiotensinogen production by the perfused rat liver.

In the Steroid Hormone Laboratory Mrs. M. Kandel has been responsible for aldosterone secretion measurements by isotope dilution and has continued her study of the adsorption of aldosterone on glass surfaces. In addition, a start has been made on gas chromatographic separation and estimation of aldosterone.

In the Clinical Investigation Laboratory the hydrolysis, extraction, and isolation of aldosterone has been under the supervision of Mrs. E. L. Anderson, with the assistance of Mrs. M. Cohen, and Mrs. E. Kuhn. With the collaboration of Dr. J. C. Laidlaw and other colleagues in the Department of Medicine, major attention has been directed to the rates of aldosterone secretion in patients with various forms of hypertensive disease.

Mrs. Anderson has also continued her study of aldosterone secretion in hypertensive dogs.

Dr. H. J. McCartney of the Department of Ophthalmology has been assisted with a study of intraocular penetration of subconjunctival hydrocortisone.

Reported by Professor W. Paul

Research problems involving the special facilities of the Department for handling and measuring radioactive isotopes, including the *in vivo* measurement of radio isotope distribution in man and animals, have occupied the biophysics division of our Department to a great extent during the past year. Several years of research on brain scanning was terminated with a critical study and evaluation of the results in 1,187 patients. Investigation of the use of stationary detectors for the measurement of radio isotope distribution has been continued with particular reference to the possibility of using positron emitters. Experiments have been carried out to examine the effectiveness of various configurations of photomultipliers and phosphor combinations. This work is being carried on with the continued cooperation of Professor N. F. Moody of the Institute of Bio-Medical Electronics.

Research in Oximetry has been continued in cooperation with the members of the Cardiovascular Unit of the Toronto General Hospital. The major effort this year has been made in the direction of developing instrument modifications which would permit the use of smaller amplifiers and a simpler circuit so as to approximate the "ratio" output of the original apparatus.

PUBLICATIONS

- BAINES, A. D. "Structure and the Excretion of PAH and Glucose in Regenerating Rat Kidneys" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 7, June 10-12, 1964, p. 34).
- COHEN, S. L. "Potentiation of Glucuronidase Hydrolysis of Sodium Pregnanediol Glucuronide" (*Canadian Journal of Biochemistry*, vol. 42, no. 1, Jan., 1964, pp. 127-38).
- DAUPHINEE, J. A. "John Harris McPhedran" (College of Physicians and Surgeons of Ontario, *Semi-Annual Report*, Jan. 1, 1964, pp. 28-31).
- DEWOLFE, M. S. "Serum Alpha-2 Macroglobulin Levels in Health and Disease" (*Clinical Chemistry*, vol. 9, no. 5, Nov., 1963, p. 506).
- DEWOLFE, M. S., JACKSON, S. H. and DAUPHINEE, J. A. "Macroglobulins in Rat Serum in Health and Experimental Renal Disease" (*Federation Proceedings*, vol. 22, no. 2, part I, Mar.-Apr., 1963, p. 648).
- DUBISKI, S. and CINADER, B. "A New Allotypic Specificity in the Mouse (MuA2)" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 5, May, 1963, pp. 1311-5).
- GORNALL, A. G. "Summary of Discussion—Session 7" (*Canadian Medical Association Journal*, vol. 90, no. 4, Jan. 25, 1964, pp. 276-7).
- GORNALL, A. G. and KANDEL, M. "Aldosterone Secretion in Humans Measured by Isotope Dilution" (*Canadian Society for Clinical Chemistry*, Abstracts of Eighth Annual Meeting, June, 1964, p. 14).
- GRANGE, B. J. and GORNALL, A. G. "Radioactivity of Rat Tissues after the Injection of Tritiated Aldosterone" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 7, June 10-12, 1964, p. 46).
- OSTROVSKY, D. and GORNALL, A. G. "Effects of Aldosterone and Other Adrenal Hormones on the Blood Pressure Responses to Renin and Angiotensin" (*Canadian Medical Association Journal*, vol. 90, no. 4, Jan. 25, 1964, pp. 180-4).
- PORTER, C. J., *et al.* "The Determination of Calcium in Serum and Urine by Atomic Absorption Spectrophotometry" (*Canadian Society for Clinical Chemistry*, Abstracts of Eighth Annual Meeting, June, 1964, p. 14).
- TOBE, B. A. "The Metabolism of the Volatile Amines: III, A Microaeration Technique for the Measurement of the Two Components of the Blood Ammonia Level" (*Canadian Medical Association Journal*, vol. 89, no. 12, Sept. 21, 1963, pp. 596-600).
- "The Metabolism of the Volatile Amines: V, The Spontaneous Formation of Ammonia in Shed Blood on Standing; VI, The Identification of the Volatile Base Present in Blood; VII, The Clinical Significance of the Two Components of the Blood Ammonia Level" (*ibid.*, vol. 89, no. 22, Nov. 30, 1963, pp. 1124-32; no. 26, Dec. 28, 1963, pp. 1320-4; vol. 90, no. 8, Feb. 22, 1964, pp. 523-30).
- TOBE, B. A. and GOLDMAN, B. S. "The Metabolism of the Volatile Amines: IV, The Role of Drugs in the Pathogenesis of Hepatic Encephalopathy" (*ibid.*, vol. 89, no. 17, Oct. 26, 1963, pp. 874-80).

PATHOLOGY

Under the direction of Professor A. C. Ritchie

The work of the Department continues to be seriously handicapped by lack of space, lack of staff, and lack of money. There is a great opportunity to improve teaching, clinical work, and investigation, but the means are lacking. If it proves possible to relocate the Boyd Museum, benefit will follow, but this is but a little part of what is needed urgently and immediately.

Teaching has continued during the year much as in the past. In the undergraduate medical course, particular attention was given to the practical course in general pathology. Teaching was reorganized on a tutorial system and an attempt was made to provide the students with a sound basis on which they could build their knowledge of microscopic pathology, so that the practical aspects of the work could be dealt with more briefly in special pathology. The time so gained was used to emphasize important correlations, and to discuss major subjects not covered previously. Demonstrations of microscopic preparations to small groups using a microprojector proved valuable. Instruction in special pathology continued through the third medical year. Many problems remain, but this extension has proved useful.

The courses in Pathology for dental students and students of Physiotherapy were given as in past years.

Graduate teaching has grown, and should grow much more. Candidates registered in the School of Graduate Studies have become more numerous. The teaching given residents training in Pathology and other specialties under the auspices of the Division of Postgraduate Medical Education has been expanded. The Department has shared in courses given for physicians in practice. All this work should be extended much further. The chief handicaps are again lack of staff, lack of space, and lack of money. The importance of this work to the future of medicine in Canada, and to the training of the academic physicians essential to the development of medical education in Canada can scarcely be overstated. It is urgent that it be developed, and supported on a very much more liberal scale.

Members of the staff have also assisted in the courses arranged by the Canadian School of Embalming, and by the Toronto Institute for Pastoral Training.

The autopsy suite in the Department grows ever more unsatisfactory. It is quite inadequate for the work demanded of it. Indeed, it is far inferior to the facilities found in most small hospitals. It is to be hoped that its reconstruction will not be long delayed.

Several members of the Department spoke to academic or scientific bodies. Dr. RITCHIE lectured on neoplasia at McGill University, and spoke on "The Action of the Initiating Agent in Epidermal Carcinogenesis" at the Sixth Canadian Cancer Congress. Dr. DONOHUE spoke on "Cerebellar Sarcoma in Childhood" at the Universities of Manchester and Dundee; on "Salt Losing Nephritis" at Dundee and Dublin; and on "Histiocytosis X" at Laval University. Dr. MOVAT read papers on "The Vascular Changes in the Advanced Stages of Acute Inflammation" to the American Association of Pathologists and Bacteriologists; on "Changes Responsible for the Progression of the Arthus Reaction" to the American Society for Experimental Biology; on "*In Vivo* and *In Vitro* Studies of Phagocytosis of Immune Complexes" to the American Society for Experimental Pathology. Dr. STEINER addressed members of the Department of Pathology at Queen's University on "Cell Degenerations"; he spoke to a combined staff meeting of the Hotel Dieu, Kingston, on "Mechanisms of Autodestruction." Dr. Steiner also visited Paris and Geneva at the invitation of the French Ministry of Foreign Affairs, lectured on "The Pathology of Runt Disease" or on "New Concepts of Cell Degenerations" to the Department of Experimental Medicine of the Collège de France, the Department of Pathology of the University of Paris, the Centre de Recherche Claude Bernard of the Hôpital St. Antoine, a combined staff meeting of the Hôpital St. Antoine, the Gastro-

enterological Society of Paris, a combined staff meeting of the Hôtel Dieu of Paris; on "The Mechanisms of Ethionine Carcinogenesis" at the Centre National de Recherche Scientifique sur le Cancer, Villejuif, and to the Department of Histology and Embryology in Geneva. Dr. STEINER also participated in a Symposium on Cell Injury at the Annual Meeting of the American Association of Pathologists and Bacteriologists in Chicago and spoke on ethionine carcinogenesis to the American Society of Experimental Pathology. Dr. STEINER delivered the annual lecture to the Pathological Society of Pittsburgh on "New Concepts of Cell Degenerations," and gave a seminar on "Ethionine Carcinogenesis" to the staff of the Department of Pathology of the University of Pittsburgh.

Dr. BROWN addressed the Tenth Annual Conference of the Ontario Cancer Treatment and Research Foundation on "Is Pathology of Prognostic Value in Carcinoma of the Breast." Dr. MUSTARD spoke on "Platelet Survival" at the International Committee for the Nomenclature of Blood Clotting Factors; on "Thrombosis and Vascular Disease" at McGill University; on "Thrombolytic Agents" at a N.I.H. Study Section; on "Epinephrine, Blood Coagulation, and Thrombosis" at the Seventeenth Annual Meeting of the American Heart Association; on "Blood Platelets and their Relation to Thrombosis" to the Midwest Blood Club; on "Phospholipid and Blood Coagulation" to the Ontario Society of Biophysics and Biochemistry; on "Factors Influencing the Fate of the Platelet" to the Atherosclerosis Study Group, London; on "A Review of Research Needs" to the World Health Organization; on "The Platelet and Vascular Disease" at the University of Oslo; on "Inter-relationship between Blood Constituents Atherosclerosis and Thrombosis" at the Fourth Conference on Cerebrovascular disease; on the "Role of Platelets in the Aetiology of Myocardial Infarction" at an Anticoagulant Symposium, Miami; on "The Effect of Adenosine Nucleotides on Blood Coagulation and Thrombus Formation" to the Canadian Society for Clinical Investigation; on "Antigen-Antibody Complexes and Platelet Aggregation" to the Federation of American Societies for Experimental Biology—Section of Experimental Pathology; on "Factors Influencing Platelet Adherence and Aggregation" to a Medical Council Seminar at Albany, and served as Chairman at a Symposium on Vascular Disease and Thrombosis, at the Inter-American Congress of Cardiology.

Dr. YOUNG read papers on "Quality Control in Clinical Chemistry—Application of the Information Obtained from an Intermedical Quality Analysis Survey" and "The Effect of Automation on the Organization and Operation of Clinical Laboratories" at the Fifth International Congress on Clinical Chemistry; on "Quality Control in the Laboratory of the Future" at the Catholic Hospital Association's Institute on Quality Analysis and Quality Control; on "The Effect of Automation on the Organization and Operation of Clinical Laboratories" at the University of Minnesota; on "Medical Laboratories in the '70s and '80s" and "The Importance of Quality Control to the Patient, his Physician, and the Community" at the Hartford Hospital. Dr. THOMPSON spoke to the Canadian Dental Association on the "Background of Cytology as Applied in Various Clinical Specialties" to the Peterborough and District Medical Society and to the Scarborough and District Medical Society on "Clinical Applications of Cytology" and served as a panelist on "Applications of Cytology and Clinical Medicine" at the meeting of the Ontario Medical Association. Dr. CROOKSTON spoke to the Ontario Association of Pathologists on "Myelosclerosis," and Dr. PHILLIPS spoke to the American Association for the Study of Liver on "Ethionine Carcinogenesis."

Dr. CONEN addressed the American Society of Human Genetics on "The 'E' Syndrome: Report of 6 typical and some chromosomally or clinically atypical cases," the Tri-City Annual Meeting at Buffalo on "Light and Electron Microscopic Studies in Muscle Disease," the Second Mammalian Conference on "Chromosome Studies in 3 Cases of Mongolism with Leukaemia and a Family with Mongolism and Leukaemia in the Same Sibship," the Ontario Association of Pathologists on "The Use of Autopsy Material for Electron Microscopy," the Royal College of Physicians

and Surgeons on "Chromosome Mosaicism in Developmental Anomalies and Malignant Disease," the American Association of Pathologists and Bacteriologists on "Mechanism of Fibrosis and Lipid Accumulation in Human Arteriosclerosis: An Electron Microscopic Study," the American Society for Experimental Pathology on "Satellite Cell: A 'New' Human Muscle Cell-Type," and the International Association for the Study of the Liver on "Electron Microscopic Study of the Developing Human Liver."

Dr. J. F. Mustard joined the staff as an Assistant Professor. Dr. Mustard is taking his share in teaching, and has shown himself a most valuable addition to the research strength. Dr. A.-M. Jézéquel, a Visiting Scientist of the Medical Research Council, has become a Research Associate. She is continuing her work in electron microscopy. Mrs. M. C. Crookston also joined the staff as a Research Associate, and is continuing her haematological studies. Dr. H. Shinozuka, formerly a Research Fellow, has remained with us as a Demonstrator. Dr. K. Arakawa and Dr. N. Taichman are new Research Fellows.

Several distinguished visitors visited the Department. Professor Janina Hury-nowicz of the Department of Neurophysiology in Torun spent a month with us. Dr. Jalihal of the Shri M. P. Shah Medical College of Zamanagar was two weeks in the Department. Dr. S. Bencosme of Queen's University spoke to the medical students. Professor J. V. Dacie of the Postgraduate Medical School of London and Dr. J. French of the University of Oxford also spent some time with us.

RESEARCH

The installation of the electron microscopes is still, after more than two years' delay, to be achieved. Work is, however, progressing and should be completed within a few months.

We must thank the Bickell Foundation for their generosity in establishing a chemical room in the Department. It has already proved of great value to us.

Dr. H. Shinozuka and Dr. Ritchie have continued their study of epidermal carcinogenesis in the mouse. Evidence suggests that carcinogenic hydrocarbons may act on cells synthesizing DNA, perhaps by modifying its synthesis. In association with Dr. Patterson, Dr. Ritchie has continued the study of the development of experimental metastases. Dr. Patterson and Mr. Pederson have developed new techniques for the study of endothelium and mesothelium.

Dr. Movat and Dr. Uriuhara completed their study of the development of the Arthus reaction, and are studying its pathogenesis. Attention is being given to the role of the leukocytes and platelets. The work on the early stages of inflammation was completed and now later stages of the reaction are being investigated. In association with Dr. Mustard, Dr. Movat is investigating the morphological aspects of platelet aggregation.

Dr. Steiner and Dr. Miyai have continued their investigation of ethionine carcinogenesis. Dr. Steiner and Dr. Arakawa are studying Runt disease, with special emphasis on changes in the liver. Dr. J. F. Mustard and Dr. Steiner are studying the effects of sinusoidal thrombosis on the liver, and with Dr. Murray of the Department of Biochemistry, Dr. Steiner is studying the effect of circulating papain on the liver. Miss Perz is studying the behaviour of proliferating liver cells, and Mr. Taichman is developing techniques for the production of casts of the biliary channels, both under Dr. Steiner's direction. Dr. Jézéquel has begun an investigation of the changes induced in tissue culture cells by virus isolated from cases of epidemic hepatitis, by Dr. J. C. Sinclair of the Department of Bacteriology. Dr. Phillips is studying the fine structural changes in cirrhosis in man.

Dr. Mustard has continued his work, partly in collaboration with Dr. Rowsell and Dr. Movat. Electron microscopical studies have shown that platelets can phagocytose latex particles. Biochemical and morphological studies both indicate a close parallel to phagocytosis by white cells. The effects of antigen-antibody com-

plexes on platelet aggregation indicate that this process is closely akin to that involving latex particles. The action of factors released from white cells is also being studied biochemically and morphologically, as are other agents known to affect platelet aggregation. Studies on vascular disease in swine and other animals, and investigations of the effect of factors such as diet, drugs, and other agents on thrombus formation in extracorporeal shunts have continued at Guelph. Studies of the haemophilic disorder in dogs deficient in factor VII, VIII, and IX have also continued. In conjunction with Dr. R. L. McMillan and Dr. K. W. G. Brown of the Department of Medicine, an investigation of the biochemical changes in the blood following myocardial infarction has been undertaken. Studies at the Toronto General Hospital have shown that the patients' electrocardiographic changes are similar to those seen in swine following transient platelet aggregation.

Dr. Thompson is continuing his study of the value of sputum cytology in the detection of asymptomatic carcinoma of the lung in collaboration with Dr. Delarue and others. He is also collaborating in the establishment of a cytology unit in the Dental School to study the value of this method in the early diagnosis of oral cancer.

Dr. Crookston is studying several aspects of myelo-proliferative disease with particular reference to platelet function and chromosomal changes. Dr. Mustard and Dr. Conen are collaborating in this work. In studying haemoglobinopathies, Dr. Crookston has detected several interesting abnormalities, including what may be a new form of haemoglobin to be called "Haemoglobin Toronto." Dr. Marie Crookston is studying autoimmune anaemia, with particular reference to those with the specificity Anti-I and Anti-i in patients with cold agglutinins, and those with the specificity Anti-P+P₁ in patients with paroxysmal cold haemoglobinuria.

In the Hospital for Sick Children, Dr. Conen has continued his studies on the chromosomes of tumour cells. A chromosomal abnormality typical of leukaemia was found to occur in patients believed to have pre-leukaemic conditions. He has also studied the development of the foetal kidney, and has collaborated in studying the development of the liver, the idiopathic respiratory distress syndrome, and coarctation of the aorta. Investigation of the ultrastructure of skeletal muscle has been continued.

Several members of the Department have prepared reports of cases, alone or in collaboration.

DIVISION OF NEUROPATHOLOGY

The sudden death of Professor Olszewski has been a very great loss to the Department. All its members have found his scientific eminence, friendship, and wisdom the more poignantly evident because of their absence. His place will not be easily filled.

Particular thanks and particular credit should go to Professor Tom who has shouldered the very heavy load of work in neuropathology left by Dr. Olszewski's death, and who has supported the Division in exemplary fashion.

Dr. Rewcastle has spent the year as a Visiting Fellow at the Institut Max Planck at Munich. On his return he will join the staff of the Toronto General Hospital, but will continue to hold a University appointment and to share in all phases of the work of the Department.

Dr. Humphrey addressed the Toronto Academy of Medicine on the "Histochemistry of Muscle Enzymes in Neuromuscular Disorders." Dr. Ezrin took part in a conference on pituitary cytology sponsored by the Collège de France. Dr. Tator addressed the American Academy of Neurological Surgery on "The Uptake of Radioiodinated Human Serum Albumin by Intracranial Neoplasms." Papers were read before the Canadian Neurological Society by Dr. Aguayo on "Cerebral Thrombo-Embolicism in Malignancy," by Dr. Francoeur on "Radioautographic Studies of Regenerating Neurones" and by Dr. Velarde on "The Ependyma of the Third Ventricle in the Rat."

RESEARCH

The work being directed by Professor Olszewski has been continued by the Fellows working under his direction.

Dr. Tator has extended his studies of the incorporation of radioactive tracers into brain tumours and the surrounding brain tissue. Dr. Aguayo has studied cerebral emboli in cases of malignant disease with nonbacterial thromboembolism, and has investigated the fine structural changes in Hurler's syndrome. Dr. Francoeur has studied the synthesis of protein in neurones after section of the axon, and has demonstrated axonal flow. Dr. Velarde has described the types of ependyma found in the third ventricle of the rat.

Dr. Ezrin is comparing the cell counts of recently described pituitary cell types with bioassay of the gland. An electron microscopical study of the pituitary cells is being undertaken.

Dr. Humphrey and Mr. Hugenholtz are determining the nerve conduction velocity in experimental allergic neuritis. With Mr. Iscove, Dr. Humphrey is studying the fine structure of muscle in normal and hypothyroid cats, and with Dr. Rewcastle its structure in neuromuscular and toxic disorders.

PUBLICATIONS

- CONEN, P. E. and ERKMAN, B. "Necropsy Spleen Samples for Chromosome Cultures" (*Lancet*, vol. 1, no. 7334, March 21, 1964, p. 665).
- "Two 'New' Sex Chromosome Mosaics XO/XX; XX/XX (Deletion of Short Arm X) and a Further XO/XY Mosaic" (*ibid.*, vol. 2, no. 7320, Dec. 14, 1963, p. 1276).
- CONEN, P. E., ERKMAN, B. and JEFFS, R. D. "47/XXY Klinefelter's Syndrome in an Infant with Abnormal Genitalia" (*Journal of Urology*, vol. 91, no. 5, May, 1964, pp. 595-9).
- CONEN, P. E., MURPHY, E. G. and DONOHUE, W. L. "Light and Electron Microscopic Studies of 'Myogranules' in a Child with Hypotonia and Muscle Weakness" (*Canadian Medical Association Journal*, vol. 89, no. 19, Nov. 9, 1963, pp. 983-6).
- CROOKSTON, M. C. (with Giblett, E. R.). "Agglutinability of Red Cells by Anti-i in Patients with Thalassaemia Major and Other Haematological Disorders" (*Nature*, vol. 201, no. 4924, March 14, 1964, pp. 1138-9).
- DONOHUE, W. L. and WAKE, E. J. "Effect of ABO Incompatibility on Pregnancy-induced Rh Isoimmunization" (*Canadian Medical Association Journal*, vol. 90, no. 1, Jan. 4, 1964, pp. 1-5).
- FERNANDO, N. V. P. and MOVAT, H. Z. "Allergic Inflammation: II, Identification of Antigen-Antibody Complexes with the Electron Microscope during the Early Phase of Allergic Inflammation" (*American Journal of Pathology*, vol. 43, no. 2, Sept., 1963, pp. 381-90).
- "Fibrillogenesis in Regenerating Tendon" (*Laboratory Investigation*, vol. 12, no. 2, Feb., 1963, pp. 214-29).
- "The Fine Structure of Connective Tissue: III, The Mast Cell" (*Experimental and Molecular Pathology*, vol. 2, no. 5, Oct., 1963, pp. 450-63).
- "The Fine Structure of the Terminal Vascular Bed: II, The Smallest Arterial Vessels: Terminal Arterioles and Metarterioles; III, The Capillaries" (*ibid.*, vol. 3, no. 1, Feb., 1964, pp. 1-9; no. 2, April, 1964, pp. 87-97).
- HOOEY, M. A. and JERRY, L. M. "The Cardiomyopathy of Muscular Dystrophy: Report of Two Cases with a Review of the Literature" (*Canadian Medical Association Journal*, vol. 90, no. 13, March 28, 1964, pp. 771-4).
- JERRY, L. M. and RITCHIE, A. C. "Bronchiolar Emphysema: A Report of a Necropsied Case of Diffuse Bronchiolectasis and Review of the Literature" (*Canadian Medical Association Journal*, vol. 90, no. 16, April 18, 1964, pp. 964-9).
- MOVAT, H. Z. and FERNANDO, N. V. P. "Acute Inflammation: The Earliest Fine Structural Changes at the Blood-Tissue Barrier" (*Laboratory Investigation*, vol. 12, no. 9, Sept., 1963, pp. 895-910).
- "The Fine Structure of the Terminal Vascular Bed: I, Small Arteries with an Internal Elastic Lamina; IV, The Venules and their Perivascular Cells (Pericytes, Adventitial Cells)" (*Experimental and Molecular Pathology*, vol. 2, no. 6, Dec., 1963, pp. 549-63; vol. 3, no. 2, April, 1964, pp. 98-114).
- MOVAT, H. Z., FERNANDO, N. V. P., URIUHARA, T. and WEISER, W. J. "Allergic Inflammation: III, The Fine Structure of Collagen Fibrils at Sites of Antigen-Antibody Interaction in Arthus-Type Lesions" (*Journal of Experimental Medicine*, vol. 118, no. 4, Oct. 1, 1963, pp. 557-64).
- MUSTARD, J. F. (with Gilbert, J. B.) "Some Effects of Atromid on Platelet Economy and Blood Coagulation in Man" (*Journal of Atherosclerosis Research*, vol. 3, no. 5/6, Sept.-Dec., 1963, pp. 623-33).

- MUSTARD, J. F., DE NICOLA, P., SHARP, A. A., THOMAS, W. A. and TULLOCH, J. A. "Thrombosis and Vascular Disease: A Review of Research Needs" (*Bulletin of the World Health Organization*, vol. 29, no. 4, 1963, pp. 552-7).
- MUSTARD, J. F., MURPHY, E. A., DOWNIE, H. G. and ROWSELL, H. C. "Heparin and Thrombus Formation: Early Suppression and Late Enhancement" (*British Journal of Haematology*, vol. 9, no. 4, Oct., 1963, pp. 548-51).
- MUSTARD, J. F., MURPHY, E. A., OGRYZLO, M. A. and SMYTHE, H. A. "Blood Coagulation and Platelet Economy in Subjects with Primary Gout" (*Canadian Medical Association Journal*, vol. 89, no. 24, Dec. 14, 1963, pp. 1207-11).
- MUSTARD, J. F., MURPHY, E. A., ROWSELL, H. C. and DOWNIE, H. G. "Platelets and Atherosclerosis" (*Journal of Atherosclerosis Research*, vol. 4, no. 1, Jan.-Feb., 1964, pp. 1-28).
- MUSTARD, J. F., ROWSELL, H. C., MURPHY, E. A. and DOWNIE, H. G. "Diet and Thrombus Formation: Quantitative Studies Using an Extracorporeal Circulation in Pigs" (*Journal of Clinical Investigation*, vol. 42, no. 11, Nov., 1963, pp. 1783-9).
- "Intimal Thrombosis in Atherosclerosis"; in *Evolution of the Atherosclerotic Plaque*, ed. Dr. Richard J. Jones, pp. 183-203. University of Chicago. 1963.
- OLSZEWski, J. (with Wisniewski, H.). "Vascular Permeability in the Area Postrema and Hypothalamus: A Study Using Iodinated Radioactive Albumin" (*Neurology*, vol. 13, no. 10, Oct., 1963, pp. 885-94).
- PRITZKER, H. G. and MACKEY, J. S. "Pulmonary Actinomycosis Simulating Bronchogenic Carcinoma" (*Canadian Medical Association Journal*, vol. 88, no. 15, Apr. 13, 1963, pp. 785-91).
- RABINOVICH, S. and LEY, D. C. H. "Mast Cell Disease" (*Canadian Medical Association Journal*, vol. 89, no. 15, Oct. 12, 1963, pp. 770-5).
- REWCASTLE, N. B. "Subacute Cerebellar Degeneration with Hodgkin's Disease" (*Archives of Neurology*, vol. 9, no. 4, Oct., 1963, pp. 407-13).
- RITCHIE, A. C., FREI, J. V. and SHINOZUKA, H. "The Duplication of Desoxyribonucleic Acid and Epidermal Carcinogenesis" (*Acta Union Internationale Contre le Cancer*, vol. 19, no. 3-4, July 22-28, 1963, pp. 579-81).
- STEINER, J. W. and BAGLIO, C. M. "Electron Microscopy of the Cytoplasm of Parenchymal Liver Cells in α -Naphthylisothiocyanate-induced Cirrhosis" (*Laboratory Investigation*, vol. 12, no. 8, Aug., 1963, pp. 765-90).
- STEINER, J. W. and MIYAI, K. "Fine Structural Changes of Liver Cell Nuclei in Ethionine Intoxication" (*Federation Proceedings*, vol. 23, no. 2, item 1126, March-April, 1964, p. 288).
- STEINER, J. W., MIYAI, K. and PHILLIPS, M. J. "Electron Microscopy of Membrane-Particle Arrays in Liver Cells of Ethionine-Intoxicated Rats" (*American Journal of Pathology*, vol. 44, no. 2, Feb., 1964, pp. 169-213).
- STEINER, J. W., PHILLIPS, M. J. and BAGLIO, C. M. "Electron Microscopy of the Excretory Pathways in the Liver in Alpha-Naphthyl Isothiocyanate Intoxication: A Study of Intrahepatic Cholestasis" (*ibid.*, vol. 43, no. 4, Oct., 1963, pp. 677-96).
- VAN PATTER, H. T. (with Rendell, W. B.). "Palliative Shunt Syndrome in Acute Cor Pulmonale Due to Massive Pulmonary Embolism" (*Canadian Medical Association Journal*, vol. 90, no. 20, May 16, 1964, pp. 1173-5).
- YOUNG, D. M. "Department of Laboratories: Constantly Increasing Opportunities for Services Calls for Flexibility in Planning and Use of Space" (*Canadian Hospital*, vol. 40, no. 5, May, 1963, pp. 52-3).
- "Experience with and Thoughts on Quality Control" (*Canadian Journal of Medical Technology*, vol. 25, no. 1, Feb., 1963, pp. 229-36; *American Journal of Medical Technology*, vol. 30, no. 2, March-April, 1964, pp. 99-122).

PHARMACOLOGY

Under the direction of Professor E. A. Sellers

The Department of Pharmacology like the other basic science Departments is responsible for instructing students of several faculties. A considerable increase in the number of students in each of these faculties, and the extension of the scope of instruction has increased the teaching commitments of the Department in large measure. At the same time, research, graduate training, and advisory functions to professional and government organizations have become recognized and important functions of a University Department. For five or six years it has been apparent that the facilities, number of staff, and means of financing are quite inadequate to meet these requirements, and this has been reported each year. It is hoped that in the

report of the Dean or President a solution to this crucial problem confronting the Department and the Faculty as a whole will be included.

The laboratory course offered to the fourth-year students in Pharmacy was extended from a half to a full year course. Most of the increased time has been devoted to the principles of bioassay. In the Faculty of Dentistry, the course in Pharmacology was transferred from the second to the third year with the result that no lectures or laboratory courses were required during the year. The increased size of each Medical class (approximately 175) made it necessary to modify and renovate the student laboratories in order to accommodate more students. Working in well-lighted, attractive, well-equipped laboratories not only has made it possible to accommodate the increase but has had a very favourable effect on the attitude of the students. In light of the factors mentioned in the introductory paragraph, the renovations are a stop-gap, but are nevertheless welcome. Additional space for research laboratories has been made available in the Wallberg Building, and has been in use for several months.

Dr. G. E. Johnson, a graduate of the University in Pharmacy and the Graduate School, joined the staff as an Assistant Professor early in October. Dr. Johnson had spent the previous fifteen months studying with Professor U. S. von Euler at the Karolinska Institute in Stockholm. It is a pleasure to welcome him to the Department.

Dr. E. Llewellyn-Thomas has been associated with the Department part-time for some five years. During the year he was appointed to the full-time staff with the rank of Associate Professor. While continuing his teaching duties, his principal responsibility is with the Institute of Biomedical Electronics in which he represents the Faculty.

Professor Rosemary D. Hawkins has found it necessary to discontinue full-time work and will retire on June 30. She has made many valuable contributions to the Faculty in the Departments of Physiology and of Pharmacology. Her good council and friendly assistance will be missed by staff and students alike.

Once more we are indebted to the Laboratory of the Attorney General of the Province of Ontario, the Defence Research Medical Laboratories of the Department of National Defence, the Food and Drug Directorate of the Department of National Health and Welfare, and the Department of Health of the Province for lecturers, facilities, or both. The value we attach to our association with these organizations extends far beyond their contribution to particular courses—the informal exchange of ideas and the fostering of personal relationship is an end in itself.

Graduate students have completed the following theses: for the M.A. degree, Dr. Frances Lettau, "Modifications of Drug-Induced Hypothermia"; for the Ph.D. degree, D. J. Ecobichon, "Properties and Classification of the Soluble Esterases of Human Tissues."

RESEARCH

Under the direction of Professor E. A. Sellers, Dr. Frances Lettau continued her study on the inter-relationship of chlorpromazine or reserpine with various drugs having effects on autonomic transmission. This work was immediately concerned with thermoregulation but the findings are pertinent in a variety of fields ranging from hypertension to psychopharmacology. In this same general field, Mr. Fred Simon studied the effects of "anti-Parkinson" drugs on shivering and non-shivering thermogenesis. It was confirmed that many drugs which are effective against the tremor of Parkinson's disease are ineffective against shivering. The mechanism of action of some of these drugs is being studied further. With the assistance of Mr. Kenneth Pritzker during the summer, Dr. Sellers continued an investigation on the regression of atherosclerotic changes in coronary vessels. In clinical-pharmacology, Dr. W. J. Russell Taylor and Dr. A. Diosy have continued the evaluation of various drugs. Spectrophotometric techniques for measuring blood and urine levels of several drugs

have been developed and distribution and excretion studies are in progress. Studies of pneumokinetic drugs administered orally, using double-blind techniques on out-patients with chronic chest disease are continuing. During the past six years medical students have been used both as subjects and as observers in a series of double-blind experiments designed to determine the extent and severity of side effects following oral and/or intramuscular administration of various anti-cholinergic drugs, a sympathomimetic pressor agent and an oxime. In addition to acquiring new information, the study was intended to familiarize medical students with the pharmacological action of the drugs administered and to demonstrate an experimental method in clinical drug evaluation. A new technique for measuring gastric function is being evaluated at the Toronto Western Hospital in collaboration with Dr. John Bingham. It is hoped that the technique will be of value for testing new anticholinergic agents.

In Professor E. Schönbaum's section, and in collaboration with Dr. Sellers, various studies (all falling in the general fields of temperature regulation, the autonomic nervous system, and thyroid function) have been continued and extended. Dr. W. Davidson has studied some cardiovascular effects of autonomic drugs in immunosympathectomized animals, while Dr. S. D. Livingstone began an investigation of the effects of immunosympathectomy on carbohydrate metabolism. Dr. Livingstone also modified a method for the study of thyroxine distribution, developed by Dr. B. Webster of the Department of Medicine, so that this technique can now be applied to the rat. Studies on the goitrogenic effects of thyroxine continued intensively. Assays of thyrotrophin in the blood and hypophysis of experimental animals have been correlated with cytological changes in the pituitary. These cytological studies are an example of beneficial collaboration between members of the Departments of Medicine and this Department. Studies on a new method for measuring protein-bound thyroxine have been commenced. Collaboration between the Department of Surgery and this Department on problems related to hypothermia have continued.

Professor W. Kalow, in collaboration with Dr. Nancy E. Simpson, continued genetic studies of unusual types of serum cholinesterase; a survey on 7,000 samples received from a Brazilian population is part of a cooperative effort involving several universities in the United States. Work on the genetics of diabetes indicates multifactorial inheritance, thus forcing a revision of older concepts. Family studies on cases with vitamin D resistant rickets were performed in collaboration with the Hospital for Sick Children, Toronto. Tests are being carried out to investigate whether hereditary factors determine the rate of intestinal absorption of certain penicillins since there are gross person-to-person differences in this respect. Dr. J. N. Cummings studied the toxicity of organophosphates in pregnant animals; intoxication of foeti relative to that of the mother was found to vary from species to species, perhaps because of differences in protein-binding and fat depots. During investigations of the role of histamine during pregnancy in animals, promethazine was found to depress respiration of newborn. This depression was peculiar in not being prominent at birth but became evident shortly after. In cooperation with the Neonatal Investigation Unit of the Hospital for Sick Children in Toronto, and with the Ontario Veterinary College in Guelph, an artificial placenta for the foetal lamb has been developed which proved effective for several hours. Dr. D. J. Ecobichon completed his survey of esterases in human tissues. This work has substantially contributed to the knowledge of distribution and properties of these enzymes. After receiving his Ph.D. in the Department, Dr. Ecobichon accepted a postdoctoral fellowship with the division of Biosciences of the National Research Council in Ottawa. On the basis of his work, the interaction between human tissue esterases and drugs is being investigated. Mr. Arnold Katz has continued the measurement of protein-binding muscle relaxants. He has started a new project on dehydrogenases in mitochondria of human skeletal muscle.

Under the direction of Professor H. Kalant, the continuing study of the nature of alcohol intoxication and addiction has included a number of investigations of

acute and chronic effects of ethanol on both the liver and the nervous system. In relation to the nervous system, a number of exploratory studies have been made of alcohol effects on catecholamine and serotonin levels in brainstem, acquisition of tolerance to alcohol and to barbiturates, and acetylcholine levels in brain. However, the most promising work is Mr. Y. Israel's investigation of cation transport by cell membranes, which may provide a fundamental explanation of the nature of tolerance and addiction to alcohol. Studies on chemistry and function of tumour cell membranes have continued in collaboration with Professor R. K. Murray (Biochemistry Department). The Morris 5123 hepatoma, a highly differentiated tumour, has been found to contain abnormally large amounts of sialic acid, and its permeability to protein is relatively unaffected by the calcium-chelating agent, EDTA. Mr. R. A. Hickie is examining the entry of various types of drugs into normal liver cells and hepatoma cells hoping to further define the permeability characteristics of the latter. These studies, together with earlier ones on the butter yellow hepatoma, are providing a clearer picture of the basic changes in cell membranes associated with the development of malignancy.

In collaboration with Dr. H. Kalant, Professor Rosemary D. Hawkins examined the effect of chronic ethanol intake on the rate of metabolism of this drug and the activities of enzymes in the liver concerned with its removal. After continuous exposure to ethanol for three weeks a more rapid metabolism of alcohol was apparent and this increased metabolism appeared to be accompanied by an increase in the activity of alcohol dehydrogenase but not of catalase in the liver. Dr. Hawkins, with Dr. Schönbaum, investigated possible changes in certain metabolic parameters in animals acclimated to cold. Such animals were found to exhibit an increased response to the hypoglycaemic effects of insulin, an altered response to a glucose load and an enhanced sensitivity of the blood free fatty acid levels to insulin. Under Dr. Hawkins' direction, some metabolic effects of drugs altering adrenoreceptor sensitivity were examined and it was found that reserpine and tetrabenazine decreased the sensitivity to the hypoglycaemic effect of insulin, but peripherally acting catecholamine depleters were without any such activity. Pre-treatment with reserpine altered the oral glucose tolerance curve, but the blood free fatty acid response to insulin remained unchanged. The decrease in the response of the reserpinized animal to the hypoglycaemic effect of insulin could be counteracted by pretreatment with alpha-methyldopa. The use of drugs inducing beta-receptor blockade failed to alter the hypoglycaemic response to insulin, suggesting that such receptors are not implicated in the hypoglycaemic effects of catecholamines released as a compensatory measure when hypoglycaemia occurs.

Professor G. E. Johnson returned to this Department last fall from the Karolinska Institute in Stockholm. In his section a study on the pharmacology of various autonomic drugs has now been started.

PUBLICATIONS

- DAVIS, R. O. and KALOW, W. "Chromatographic Separation of Succinylcholine and its Hydrolysis Products" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 9, Sept., 1963, pp. 1991-5).
- ECOBICHON, D. J. and KALOW, W. "Action of Organophosphorus Compounds upon Esterases of Human Liver" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 7, July, 1963, pp. 1537-46).
- "Properties and Classification of the Soluble Esterases of Human Kidney" (*ibid.*, vol. 42, no. 2, Feb., 1964, pp. 277-86).
- ISRAEL, Y. and KALANT, H. "Effect of Ethanol on the Transport of Sodium in Frog Skin" (*Nature*, vol. 200, no. 4905, 1963, pp. 476-8).
- JOHNSON, G. E. "The Effect of Cold Exposure on the Catecholamine Excretion of Adrenalectomized Rats Treated with Reserpine" (*Acta physiologica scandinavica*, vol. 59, no. 4, 1963, pp. 438-44).
- "The Influence of Chlorpromazine on the Catecholamine Excretion of Normal and Cold Acclimated Rats" (*ibid.*, vol. 60, no. 2, 1964, pp. 181-8).
- JOHNSON, G. E., SELLERS, E. A. and SCHÖNBAUM, E. "Interrelationship of Temperature to Action of Drugs" (*Federation Proceedings*, vol. 22, no. 3, May-June, 1963, pp. 745-9).

- KALANT, H., HAWKINS, R. D. and WATKIN, G. S. "The Effect of Ethanol on the Metabolic Rate of Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 10, Oct., 1963, pp. 2197-203).
- KALANT, H., MONS, WILHELMINA and GUTTMAN, MARTA. "Sialic Acid Content of Normal Rat Liver and of DAB-induced Hepatomata" (*Canadian Journal of Biochemistry and Physiology*, vol. 42, no. 1, Jan., 1964, pp. 25-31).
- KALOW, W. "The Influence of pH on the Hydrolysis of Benzoylcholine by Pseudocholinesterase of Human Plasma" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 2, March, 1964, pp. 161-8).
- LUCAS, G. H. W. and FABIERKIEWICZ, C. "Useful Tests to Identify Phenothiazine Tranquilizers" (*Journal of Forensic Sciences*, vol. 8, 1963, pp. 462-76).
- LUCAS, G. H. W. and IMRIE, R. J. "Miscellaneous Poisoning, Acute" (*Current Therapy*, 1963, p. 665).
- SCHÖNBAUM, E., ROW, V., SELLERS, E. A. and JOHNSON, McA. "A Thyroid Rebound Phenomenon" (*The Physiologist*, vol. 6, Aug., 1963, p. 269).
- SCHÖNBAUM, E., SELLERS, E. A. and JOHNSON, G. E. "Heat Production and Noradrenaline" (*Federation Proceedings*, vol. 22, no. 3, May-June, 1963, pp. 917-9).
- SELLERS, E. A. and SCHÖNBAUM, E. "Catecholamines in Acclimation to Cold: Historical Survey" (*Federation Proceedings*, vol. 22, no. 3, May-June, 1963, pp. 909-10).
- SIMPSON, N. E. "La Genetique du Diabète: Une Revue" (*L'Union Medical du Canada*, vol. 92, no. 11, Nov., 1963, pp. 1212-7).
- SIMPSON, N. E. and KALOW, W. "Serum Cholinesterase Levels in Families and Twins" (*American Journal of Human Genetics*, vol. 15, 1963, pp. 280-7).
- VAN GOCH, J. J., DEWIED, D. and SCHÖNBAUM, E. "Adrenocorticotrophic Activity in the Rat Assessed by *in vivo* and *in vitro* Indices" (*American Journal of Physiology*, vol. 205, no. 6, Dec., 1963, pp. 1083-8).

PHYSIOLOGY

Under the direction of Professor C. H. Best

During the session 1963-64, the Physiological Society held a Symposium on Insulin in the Body, nine papers being presented by members of the Department of Physiology and the Banting and Best Department of Medical Research. Dr. N. Baker of the Veterans Administration Center, Los Angeles spoke at a meeting in November. The School of Graduate Studies appointed as Visiting Lecturers, Dr. S. Schiller of New York Medical College and Dr. L. Roden, University of Chicago. The staff of the Charles H. Best Institute were happy to assist in the arrangements for these lectures.

Details of the programme are as follows: Dr. Charles H. Best, introductory remarks; Dr. J. Logothetopoulos, a report on a conference on the histophysiology of the islets of Langerhans, Uppsala, Sweden; Dr. Anna Sirek, a report on the International Symposium on Diabetes, Modena, Italy. Dr. D. W. Clarke on "Assay of Insulin in Blood by the Epididymal Fat Pad and by the Rat Diaphragm." Dr. H. P. Geerling on "A Comparison of Immunological Assays for Insulin in Blood." Drs. J. Campbell and K. S. Rastogi on "Immunological Assay of Insulin in Blood according to Hales and Randle: Method and Results" (discussion, Dr. N. Morley). Drs. J. Davidson and R. E. Haist on "A New Assay for Insulin in Blood: Method and Results" (discussion, Dr. S. W. Hartroft). Drs. M. Vranic and A. M. Rappaport on "The Effects of Ligation of the Hepatic Artery on the Depancreatized Dog." Dr. G. J. Hetenyi, "Hypoglycaemia and the Adrenals as Two Factors Effecting Hepatic Glucose Production and 'Glucose Space' after Insulin: Experiments on Non-anaesthetized Dogs." Drs. N. F. Forbath and G. J. Hetenyi on "The Kinetics of the Intravenous Glucose Tolerance Test in Normal and Diabetic Subjects" (discussion, Dr. K. J. R. Wightman). Dr. Nome Baker on "Metabolism of Glucose in Normal Mice." Dr. Sara Schiller on "Studies on Hormonal Control of Acid Mucopolysaccharides." Dr. Lennart Roden, "Studies on the Structure of Heparin and Other Mucopolysaccharides."

The following scholarly addresses were given by members of the Staff: Professor O. V. SIREK on "Serum Glycoproteins in Newborn Infants of Diabetic Mothers" at

the First International Symposium on Diabetes, University of Modena, Italy, and at the Department of Experimental Medicine of the University of Frankfurt, Germany; and on "Relationship of Insulin to Growth Hormone" at the Academy of Medicine, Dusseldorf, Germany and at the Hoechst Pharmaceuticals, Frankfurt, Germany; and on "Persistence of Insulin-like Activity in Pancreatectomized and Houssay Dogs" at the Toronto Diabetes Association. Professor A. SIREK on "Experimental Diabetes" at the Department of Experimental Medicine of the University of Frankfurt, Germany; and "The Nature of the Hyperglycaemic Substance Released by Growth Hormone" at the Toronto Diabetes Association.

Professor A. M. RAPPAPORT on "Pathways of Hepatic Microcirculation" at the meeting of the Canadian Anaesthetists, Toronto; and on "Hepatic Microcirculation" at the Medical Staff Meeting of the New Mount Sinai Hospital; and on "Hepatic Venography" at the Clinical Research Society, Toronto. Professor W. S. HARTROFT on "Atheroma" at the New Brunswick Medical Society's Eighty-third Annual Meeting and the Prince Edward Island Division of the Canadian Medical Association; and on "Saturated Fat, Cholesterol, and Myocardial Infarction Experimental Studies" at the Fifty-eighth Annual Convention of the Alberta Division of the Canadian Medical Association; and on "The Juxtaglomerular Apparatus" at the Carl V. Weller Lecture, Ann Arbor, Michigan; and on "The Production of Infarcts by means of a Thrombogenic Diet in Experimental Animals" at the University of London, England; and on "The Nature of Fatty Liver" at the Royal Free Hospital, London, England; and on "Metanutritional Cirrhosis in Animals and Probable Clinical Significance" at the Institute of Child Health, Birmingham, England. Graduate students have completed the following theses for the M.A. degree: Miss D. I. M. Harris, "Factors Influencing Amino Acid Metabolism and Urea Synthesis in Liver Tissue"; D. E. Nickerson, "Effects of Altered Stimulation on the Volume of the Islets of Langerhans"; F. A. Valeriote, "The Combined Effects of Thermal Trauma and X-irradiation on the Rat"; Miss M. J. Macnab, "Studies on the Release and Properties of Clearing Factor Lipase."

RESEARCH

In Professor R. E. Haist's section, studies on the insulin of blood have been continuing actively. Dr. J. K. Davidson, Dr. M. A. Ashworth, and Dr. B. Lin have been investigating the effect of a glucose load on insulin levels in blood serum from different sampling sites in animals and have also followed the changes in insulin levels in peripheral blood samples following glucose in man. They are now attempting to obtain information concerning the form in which insulin is secreted by the beta cells of the pancreatic islets. Dr. Davidson and Mr. D. Nickerson have been studying effects of undernutrition and of certain steroid substances on the insulin content of the pancreas, the total islet volume and the levels of insulin in peripheral blood. Miss J. Quinlan and Dr. Lin have been working on insulin assay procedures. Dr. M. J. Henderson has investigated the effects of insulin and hypothermia on the levels of free glucose in various tissues of the rat. Mrs. A. Crawford, Mrs. M. Evans, and Mr. M. Kroch have been studying the influence of hypothermia on the actions of glucagon, adrenaline, growth hormone, insulin, and tolbutamide on the blood levels of glucose, inorganic phosphorus, potassium, and sodium.

In Professor J. Campbell's section, studies on the hormonal control of lipid mobilization and utilization have been continued with the assistance of Mr. G. R. Green. Alterations produced by hypophysectomy, by adrenalectomy, by alloxan diabetes, by hypophysectomy with diabetes, and by adrenalectomy with diabetes, in the blood and tissue of the rat, and in the metabolism *in vitro* of adipose tissue from these animals have been determined. The results indicate that the ameliorating effects of hypophysectomy and adrenalectomy on diabetes stem from reduced rates of release of free fatty acids by adipose tissue. With Mr. K. Shumak, the existence of a hypothalamic factor that accelerates the release of fat mobilizing factor from anterior

pituitary gland tissue *in vitro* has been shown. It is indicated that the amount of this material extractable from the hypothalamus is increased by fasting. With Dr. K. S. Rastogi, it has been found that the administration of growth hormone in the dog raised the level of insulin in serum several fold, and greatly increased the rise in serum insulin that occurred following a meal or a glucose load. These responses were associated with reduction in the insulin extractable from the pancreas and, in some of the animals with diabetes. The effects of hypophysectomy on these responses to growth hormone have also been determined. With Dr. Rastogi and Dr. H. R. Hausler, it has been shown that cortisone induced a marked rise in serum insulin, with reduction in the insulin content of the pancreas, and with hyperglycaemia in the chinese hamster. Mr. Green found very high levels of free fatty acids in blood and tissues, and high rates of release of free fatty acids from adipose tissue *in vitro* in this species.

Dr. Hausler, Dr. T. M. Sibay, and Miss B. Stachowska have continued their work on the retinopathy of diabetes. The relation of heredity to the occurrence of spontaneous diabetes in chinese hamsters, and ocular changes in the diabetic animals, are being studied. It has been possible to induce permanent diabetes in chinese hamsters by the combined administration of cortisone and growth hormone. Retinopathy, with high frequency of occurrence, has been found in these diabetic animals, thus providing a means of studying this lesion experimentally.

In Professor G. Hetenyi's section, a technique for the determination of the radioactive strength of doubly labelled aqueous samples has been worked out by Dr. R. Ninomiya and Dr. Hetenyi. This technique is being applied now, in collaboration with Professor G. A. Wrenshall, to prove the validity of tracer measured rates of transfer of glucose in intact dogs. A difference in the hepatic response to insulin between normal and adrenalectomized dogs has been demonstrated. The influence of some endocrine factors on insulin induced accumulation of glucose by the liver cells has been shown by Mrs. F. K. Waterman and Dr. Hetenyi. Dr. N. Forbath has been analysing the kinetics of the i.v. glucose tolerance test in normal and diabetic subjects using tracer methods.

Professor F. C. Monkhouse, with Mrs. S. Milojevic, has continued studies on plasma antithrombin. An alpha globulin fraction of high antithrombin activity has been prepared from beef plasma. During the past year it was discovered that a three-fold increase in plasma antithrombin activity occurs in rabbits following the intravenous injection of papain. This increase is accompanied by an increase in plasma mucopolysaccharides. Miss M. Macnab is studying the clearing factor lipase release in these animals. Miss Macnab, in association with Mr. W. Van Ast, has continued to investigate the role of clearing factor lipase in the transfer and metabolism of triglycerides. Dr. F. Daramola, in association with Dr. Monkhouse, has studied the action of a purified proteolytic enzyme from cultures of *aspergillus oryzae* on blood coagulation factors. It is hoped that this enzyme may prove useful as a thrombolytic therapeutic agent in the treatment and control of thrombosis. Dr. A. Horner joined the section in October and has begun a study of the metabolism and physiological role of the mucopolysaccharides. Mucopolysaccharides are being extracted from various tissues of a number of animal species and their chemical and biological properties compared.

In Professor A. M. Rappaport's section, research is continuing on the effect of drugs (metaraminol, decholine) and ammonium salts on the portal and on the hepatic arterial circulation. These investigations are done in cooperation with Dr. Llewellyn-Thomas from the Department of Biomedical Electronics and Dr. H. B. Fairley and Dr. B. A. Britt of the Department of Anaesthesia, Toronto General Hospital.

The progressive changes in the hepatic microcirculation of choline-deficient mice drinking 15 per cent alcohol *ad libitum*, have been recorded *in vivo* on a 450 foot long film. Explanatory drawings and animated scenes prepared by Miss R. E. Blackstock of the Department of Art as Applied to Medicine have been used for

the completion of the film showing the normal microcirculation of the liver in mice and rats.

The immediate effects on the dog of temporary deprivation of its pancreatic hormones are further studied with the aid of a pediculated pancreatic transplant in cooperation with Dr. Wrenshall. The changes in glucose tolerance were investigated together with Dr. M. Vranic and the alterations in the blood insulin levels were determined by Dr. Davidson in a similar preparation. The findings are to be presented at the International Diabetes Federation Congress in Toronto, July, 1964.

Dr. Rappaport and Dr. Vranic are also investigating the effects of hepatic ischaemia on diabetic dogs.

Hepatic venography has been applied in the cardiovascular ward of the Toronto General Hospital and has aided in the diagnosis of complicated cases of portal hypertension.

In Professor J. W. Scott's section there have been three main projects continued. Dr. D. Briant has continued his work using telemetering equipment to observe activity in the vestibular nerve. Dr. A. Kertesz working with Dr. R. R. Tasker has undertaken a study of the origin of drug induced tremors. Dr. S. Appleby has developed a method of plotting on audiogram for newborn infants.

In the section of Professors O. V. Sirek and A. Sirek research work has been carried out along three lines: (a) The nature of the hyperglycaemic substance released into the pancreaticoduodenal vein after a single injection of growth hormone has been studied in dogs, and evidence was obtained that the substance is serotonin. (b) Methods for the separation and identification of acid mucopolysaccharides in vessels of normal and diabetic animals have been introduced. (c) Dr. H. Geerling (Nata Fellow) and Dr. E. Geerling, from the University of Hamburg, Germany, have spent approximately one year in this section studying the nature of the binding of radioactive I^{131} -insulin to serum proteins by immunoelectrophoresis, disc-electrophoresis in acrylamide gel and by preparative ultracentrifugation.

The Director of the Research Institute at the Hospital for Sick Children, Professor W. S. Hartroft, and certain members of the staff of the Research Institute, Professor D. Fraser and Professor J. M. Martin, with part-time and honorary appointments in the Department of Physiology, have made important contributions to the work of the Department at the undergraduate and graduate levels as well as carrying out their own research programmes. Dr. Hartroft has continued his outstanding investigation of liver function. Dr. Fraser has extended his studies on the parathyroid gland, phosphorus and calcium metabolism. Dr. Martin's research has been concerned with the insulin levels in blood, particularly in young human subjects.

Professor W. Johnson of the Defence Research Medical Laboratories, an honorary member of the Department, has also assisted greatly in the work of the Department, as well as extending his important researches on the vestibular apparatus and problems concerning equilibrium. Dr. J. Archibald, Honorary Consultant Veterinarian, continues to give valuable assistance to the Department, especially in relation to animal care.

PUBLICATIONS

- CAMPBELL, J., MARTUCCI, A. D. and GREEN, G. R. "Plasma Albumin as an Acceptor of Free Fatty Acids" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 7, abstract 77, 1964, p. 32).
- DAVIDSON, J. K., ASHWORTH, M. A., LIN, B., RAPPAPORT, A. M. and HAIST, R. E. "Naturally Biologically Active and Total Serum Insulin in Anaesthetized Dogs during i.v. Glucose Tolerance Test" (*Federation Proceedings*, vol. 23/1, no. 2, abstract no. 2152, 1964, p. 460).
- DAVIDSON, J. K. and HAIST, R. E. "A New Method for Recovery of Insulin Activity from Blood Serum" (*Lancet*, vol. 2, Sept., 1963, pp. 656-8).
- "A Study of the Levels of Extractable Insulin of Guinea Pig Pancreas" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 3, May, 1964, pp. 315-7).
- DAVIDSON, J. K., HAIST, R. E. and BEST, C. H. "A New Method for Recovering Biologically Active Insulin from Acid Alcoholic Extracts of Pancreas of Guinea-pigs and Other Animals" (*Diabetes*, vol. 12, no. 4, July-Aug., 1963, p. 352).

- "Studies Employing a New Method for the Recovery of Biologically Active Insulin from Acid Alcoholic Extracts of Pancreas and Blood Serum" (*Diabetes*, vol. 12, no. 5, Sept.-Oct., 1963, pp. 448-53).
- FORBATH, N. "Radioactive Isotopes and Diabetes" (*Canadian Diabetes Association Newsletter*, vol. 11, no. 2, 1964, p. 21).
- FORBATH, N., HETENYI, JR., G. "Endogenous Glucose Production and Utilization before and after an Intravenous Glucose Load in Normal and Diabetic Subjects" (*Canadian Medical Association Journal*, vol. 90, no. 7, Feb. 15, 1964, p. 472).
- GRAYBIEL, A. and JOHNSON, W. H. "A Comparison of the Symptomatology Experienced by Healthy Persons and Subjects with Loss of Labyrinthine Function when Exposed to Unusual Patterns of Centripetal Force in a Counter Rotating Room" (*Annals of Otology, Rhinology, and Laryngology*, vol. 72, no. 2, 1963, pp. 357-73).
- HAIST, R. E. "A Promising Approach to the Study of Diabetes" (*Varsity Graduate, University of Toronto*, vol. 11, no. 2, May, 1964, pp. 32-4).
- HARTROFT, P. M., SUTHERLAND, L. and HARTROFT, W. S. "Juxtaglomerular Cells as the Source of Renin: Further Studies with the Fluorescent Antibody Technique and the Effect of Passive Transfer of Antirenin" (*Canadian Medical Association Journal*, vol. 90, no. 4, Jan. 25, 1964, pp. 163-6).
- HARTROFT, W. S. "Experimental Hepatic Injury"; in *Diseases of the Liver*, by L. Schiff, pp. 101-41. Philadelphia: J. B. Lippincott Company. 1963.
- "Experimental Production of Vascular Lesions" (*Annals of the New York Academy of Sciences*, vol. 3, article 1, 1963, pp. 513-57).
- "Pathogenesis of Ceroid Pigment: Preceroid a Precursor" (*Federation Proceedings*, vol. 22, no. 2, part 1, abstract no. 536, March-April, 1963, p. 250).
- HARTROFT, W. S. and THOMAS, W. A. "Induction of Experimental Atherosclerosis in Various Experimental Animals"; in *Atherosclerosis and Its Origin*, by G. H. Bourne and M. Sandler, pp. 439-57. New York: Academic Press, 1963.
- HAWKINS, R. D., CRAWFORD, A. L. and HAIST, R. E. "The Effect of Reserpine on the Sensitivity of Rats to Insulin and Tolbutamide" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 1, 1964, pp. 13-20).
- HAWKINS, R. D. and HAIST, R. E. "The Effect of Adrenalectomy, Dihydroergotamine, and Dibenzylamine on the Sensitivity of Rats to Tolbutamide" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 10, 1963, pp. 2189-95).
- "The Effect of Tolbutamide on Hepatic Glucose-6-phosphatase Activity in Rats Pretreated with Insulin for 4 Weeks" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 3, May, 1964, pp. 341-8).
- HENDERSON, M. J., HAAG, A. L. "Effect of Hypothermia and Insulin on the Distribution of Glucose in Tissues" (*Federation Proceedings*, vol. 23, no. 2, part 1, abstract no. 1256, March-April, 1964, p. 310).
- HETENYI, JR., G., KOPSTICK, F. K. and RETELSTORF, L. J. "The Effect of Insulin on the Distribution of Glucose between the Blood Plasma and the Liver in Alloxan-Diabetic and Adrenalectomized Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 12, 1963, pp. 2431-9).
- HUNTER, J. and HAIST, R. E. "A Study of Blood Pressure Responses During Hypothermia in Hypophysectomized Rats" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 2, 1964, pp. 209-15).
- "A Study of the Effects of Pitressin and Serotonin in the Maintenance of Blood Pressure in the Hypophysectomized Hypothermic Rat" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 2, 1964, pp. 217-24).
- LEEMING, J. M. and FRASER, D. "Dependence upon Intact Parathyroids for Action of Vitamin D on Renal Phosphate Conservation in the Rachitic Dog" (*Journal of Paediatrics*, vol. 63, Oct., 1963, p. 729).
- MAYKUT, M. O., NISHIKAWARA, M. T. and HAIST, R. E. "The Effect of Thyroid Administration on the Pancreatic Amylase Activity of Hypophysectomized and Intact Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 6, 1963, pp. 1373-9).
- MONKHOUSE, F. C. "Heparin Assay Using Purified Reagents" (*Thrombosis et Diathesis Haemorrhagica*, supplement 2, vol. 9, 1963, p. 45).
- "The Influence of Inorganic Salts on Plasma Antithrombin Activity" (*ibid.*, vol. 9, no. 3/4, 1963, pp. 387-94).
- "Tissue Heparin and Plasma Clearing Factor Lipase Levels in the Rat" (*Federation Proceedings*, vol. 22, no. 2, 1963, p. 503).
- MONKHOUSE, F. C. and BAKER, D. G. "Skin Heparin Levels and Postheparin Plasma Clearing Factor Lipase Levels in Irradiated Adrenalectomized and Cortisone-Treated Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 41, no. 9, 1963, pp. 1901-6).
- MONKHOUSE, F. C. and FISHER, A. M. "Protamine Zinc Insulin and Lipemia" (*Journal of the American Medical Association*, vol. 184, 1963, p. 736).
- MONKHOUSE, F. C. and MILOJEVIC, S. "The Separation of Antithrombin and Heparin Cofactor from Plasma Albumin" (*Thrombosis et Diathesis Haemorrhagica*, vol. 9, no. 1/2, 1963, p. 221).
- NISHIKAWARA, M. T., HAWKINS, R. D. and HAIST, R. E. "The Effect of ACTH, Cortisone,

- Desoxycorticosterone and ACTH plus Thyroid on the Amylolytic Activity of the Pancreas in Hypophysectomized and Intact Rats" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 1, 1964, pp. 63-73).
- PORTA, E. A. and HARTROFT, W. S. "Early Deposition of Ceroid in Küpffer Cells of Mice Fed Hepatic Necrogenic Diets" (*Canadian Medical Association Journal*, vol. 88, no. 23, June 8, 1963, pp. 1167-9).
- RAPPAPORT, A. M. "Acinar Units and the Pathophysiology of the Liver"; in *The Liver*, by Ch. Rouiller, pp. 265-328. New York and London: Academic Press. 1963.
- "Fetal and Infant Liver Function and Structure Discussion Workshop" (*Annals of the New York Academy of Sciences*, vol. 3, article 1, 1963, pp. 527-34).
- RAPPAPORT, A. M., HOLMES, B., STOLBERG, H. O., MCINTYRE, J. L. and BAIRD, R. J. "Hepatic Venography" (*Gastroenterology*, vol. 46, no. 2, Feb., 1964, pp. 115-27).
- RAPPAPORT, A. M., POTVIN, P. "Aspect fonctional de la structure hepatique normale et pathologique" (*Revue internationale d'hepatologie*, vol. 13, no. 5, 1963, pp. 291-358).
- SCOTT, J. W. "Medicine as a General Education" (*Canadian Medical Association Journal*, vol. 90, no. 14, Apr. 4, 1964, pp. 869-71).
- SEEGERS, W. H., COLE, E. R., HARMISON, C. R. and MONKHOUSE, F. C. "Neutralization of Autoprothrombin C Activity with Antithrombin" (*Canadian Journal of Biochemistry*, vol. 42, no. 3, May, 1964, pp. 359-64).
- SIREK, A., SCHOEFLING, K., WEBSTER, M. and SIREK, O. V. "Absence of Effect of Bovine Growth Hormone on Blood Sugar of Houssay Dogs" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 3, May, 1964, pp. 299-301).
- SIREK, O. V. and SIREK, A. "The Physiology of Growth Hormone"; in *Ergebnisse der inneren Medizin und Kinderheilkunde*, by L. Heilmeyer, R. Schoen, A. Prader, pp. 217-63. Berlin, Göttingen, Heidelberg: Springer-Verlag. 1964.
- SUNAHARA, F. A., JOHNSON, W. H. and TAYLOR, N. B. G. "Vestibular Stimulation and Forearm Blood Flow" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, no. 2, March, 1964, pp. 199-207).

PSYCHIATRY

Under the direction of Professor A. B. Stokes

The University is distinguishable from all other social institutions insofar as it is a trustee of knowledge. This is not to say that all knowledge is concentrated in the University, far from it: but the University function is exercised in the belief that what is known is related to what is unknown as to a universal integrate, and that the University must attend to the whole in its entirety, as well as to the parts which seem to pattern holistic development.

A concern for both the whole and the part arises in each University Department, and in varying ways decides both the extrinsic relationships and the intrinsic organization of the Department. Such decisions are not made without difficulties that have to be confronted and resolved. For example, what facts from the storehouse of knowledge may allow the education of principles which can be communicated to the student in an organized fashion? what principles may be put forward for immediate fruitful application in the enrichment of day to day living? and lastly what dark unknowns offer the hope of illumination through research effort? The past, the present, and the future are implicated in a trusteeship of knowledge.

The Department of Psychiatry, as a member Department of the Medical Faculty, has the responsibilities of teaching Psychiatry both to medical undergraduates and to graduate physicians: the teaching involves an educative process and a training experience—the former embraces the biological and behavioural aspects of mental disability, the latter the techniques of current psychiatric practice. Neither education nor training can be undertaken apart from community and hospital services. The provision of exemplary services is a fundamental need for psychiatric education and training.

However the public need for psychiatric services is urgently pressing. The network of psychiatric services, organized by the Department of Psychiatry, comprises sixteen clinical units: these are maintained in great measure by the graduate

physicians studying for their specialist standing as psychiatrists. These graduate students work and practice under the supervision of University teachers: clearly the University function must be protected from an overload of service demands. In the long run, the production of psychiatrists will allow the implementation of treatment resources within the community but only if the psychiatrist-to-be is equal to his future tasks.

But the tasks of the future will make demands on new knowledge of a practical kind which will emerge from new knowledge of a basic kind. To meet these demands the clinical educational setting must be related to research enquiries of clinical, clinical laboratory, and laboratory kind. Yet again the work of enquiring must be fostered in its own right with protection from an overload of service and too many hours of teaching. Further, as a part of research organization, relationships with other Departments, communication across departmental boundaries, occasional cross appointments will require attention.

In short, with a discipline like Psychiatry, which thrives on the application of many sciences (genetic, physical, biological, psychological, and sociological) the University whole must be maintained as a balanced appreciation of many parts, each cultivated in a nursery of services and readied for action in the broad field of mental health.

The Psychiatric Institute

The triad service, educational, and research responsibilities of the Department of Psychiatry have been kept in mind continuously in planning the new Psychiatric Institute. This Institute will replace the present teaching hospital—the Toronto Psychiatric Hospital—which for many years has suffered from lack of space and outmoded physical facilities in the development of Psychiatry, psychiatrists, and psychiatric services. An opportunity has now been realized to coordinate the various activities of the Toronto Psychiatric Hospital, hitherto dispersed in many extramural locations, under one roof, and to extend the scope of services in a manner appropriate to the best educational and research efforts.

The new opportunity has been provided by the Ontario Government with particular endorsements by the Prime Minister, the Hon. J. P. Robarts, Q.C., and the Minister of Health, the Hon. M. B. Dymond, M. D. Their sensitive appreciation of needs in the Mental Health field and their exercise of authority to meet the needs are a continuing boon to the community, to the professions implicated in the field of mental illness, and to the University Department of Psychiatry. Under the Minister's direction the staff of the Provincial Department of Health, and particularly the senior officers of the Division of Mental Health, have cooperated in major fashion in the planning of a unique psychiatric facility unequalled anywhere.

The Institute building, already under construction at the south west corner of the University campus—College and Huron—is to be completed on or about September 1965. To the south a main hospital block will rise fourteen stories: to the north, and functionally connected with the hospital block, is a three storied educational and research building. Some two hundred beds will be provided in autonomous services including a children's unit, a forensic unit, a day and night care unit, and an emergency short stay unit. The extensive outpatient facilities will serve adults, children, and adolescents as well as patients referred by the courts. Special studies of mental retardation, geriatrics, speech, and communication difficulties, etc., are provided for. In every detail, as far as prevision allows, the intention is clear—to give the most up-to-date treatment to mentally ill patients, to study mental illness from very many standpoints so that better techniques of treatment may emerge, and to teach and train professional personnel to a greater competence in service. Always collaboration with other disciplines and institutions is envisaged with a particular emphasis on strong community relationships.

The name of the Institute—the Doctor C. K. Clarke Institute of Psychiatry—has a notable significance. In 1906 Dr. C. K. Clarke was appointed the first Professor

of Psychiatry in the University of Toronto. In his era he held three other important appointments: he was medical superintendent of what is now the Ontario Hospital Toronto, he was medical superintendent of the Toronto General Hospital, and he served a term as Dean of the Medical Faculty in the University of Toronto. His concern and responsibility for Medical Education, General Medicine, and Psychiatry was momentous in his day. He strove for and eventually saw the erection of the Toronto Psychiatric Hospital which now might be thought of as the precursor of the Institute which bears his name.

The Ontario Mental Health Foundation

The Doctor C. K. Clarke Institute of Psychiatry will function under its own Board of Directors and through that board will be related to the Ontario Mental Health Foundation. Mr. Justice Arthur Kelly Chairman of the Ontario Mental Health Foundation has been untiring in negotiating with the Ontario Government and the Board of Management of the University of Toronto. Through his efforts the organizational pattern of the Institute is emerging as a collaborative enterprise involving the Institute Board, the Foundation, and the University. We, in the Department, are in great debt to Mr. Justice Kelly for his advocacy and espousal of Psychiatry and we welcome Mr. Ian D. Davidson as Chairman of the Institute Board.

Undergraduate instruction in Psychiatry has been reviewed over the past year. It is becoming more and more evident that the basic physician, whether he practises later in a specialty or in general practice, must be competent to treat the emotional and mental components of the presenting illness. In anticipation of his future role direct involvement with psychiatrically ill patients must be arranged for the student despite the difficulties of numbers. A committee under Dr. W. E. Boothroyd has studied the teaching problems involved and has made recommendations for implementation next year. A much greater emphasis will be placed on interview and treatment techniques.

Graduate instruction in Psychiatry covers a four-year period, divided into a two-year Diploma Course and a subsequent two years in concentration areas (such as, Mental Hospital work, General Hospital psychiatry, child psychiatry, psychotherapy, etc.). A committee under Dr. A. Miller has examined the current teaching schedules and has recommended widespread changes. One very important change is the extension of the Diploma Course to three calendar years. This recommendation will be presented to the Faculty for its consideration in the new academic year.

In all 81 physicians are enrolled in the Department of Psychiatry as graduate students. Of these 20 were successful in the Diploma examination. Of past diplomates 18 were successful in the certification examinations of the Royal College: 4 obtained their Fellowship by examination.

Other courses were provided by the Department in Clinical Psychology, Social Work, Nursing, Occupational Therapy, Speech and Audiology, Public Health, Probation work, and Pastoral Counselling.

In all many thousands of hours were devoted to teaching by 71 teachers. Of the teachers special mention is made of Dr. J. Berg, Visiting Professor in Mental Retardation. Dr. Berg is the third Visiting Professor brought to Toronto from England under the financial aegis of the Ontario Association for the Mentally Retarded. His stimulating influence on local developments in mental retardation has been greatly appreciated by all workers in the field.

A number of seminars have been conducted over the academic year. The most important was that organized by Dr. Kenneth Gray and his colleagues in Forensic Psychiatry. Over two days a group of specialist psychiatrists were addressed by distinguished judges of the High Court and other eminent lawyers on legal aspects of psychiatry. An opportunity was provided for mutual interchange of experience and opinions with the consequent clarification of many previously confused issues. The proceedings will be published.

Throughout the academic year a number of prominent psychiatrists, from centres far afield, have visited the Department to deliver lectures and to meet with groups of interested local colleagues. It is proposed to develop this kind of interchange on a more formal and more regular basis.

In their turn many members of the Department's staff have been invited to visit other centres. Numerous invitations too have been accepted for staff contributions to radio and television programmes of Mental Health importance.

The library facilities continue to improve and are used extensively. Mr. Cyril Greenland has been appointed to the University staff as Archivist. His enthusiastic efforts have uncovered interesting and valuable source material referring to the history of Canadian Psychiatry.

Again it is a pleasure to record a great indebtedness to many friends, donors, and supporters who have interested themselves in the work of the University Department of Psychiatry. The Provincial Department of Health, and particularly the Minister, has always been ready to consider new ideas and to foster their implementation when resource and timing were deemed appropriate. Special thanks are accorded The Ontario Mental Health Foundation, the McLaughlin Foundation, the Atkinson Charitable Foundation, the Laidlaw Foundation, the Queen Elizabeth II Canadian Research Fund, the Medical Alumni Association, the Ontario Association for the Mentally Retarded and the Medical Research Council for support both ideological and financial.

The Department of Psychiatry is about to enter a new phase of functional organization. Numerous problems will arise in the circumstances of extension and repatterning: they will be resolved by the strengths of collegueship with the support of the Dean and the Medical Faculty. There are high hopes for future endeavour.

RESEARCH

Reported by Professor J. W. Lovett Doust

In the field of Biological Psychiatry a number of burgeoning research programmes are underway. On the Clinical Investigation Unit of Toronto Psychiatric Hospital, Dr. H. C. Stancer has collaborated with Dr. B. Quarrington in the longitudinal investigation of recurrent psychiatric illness using the I.B.M. computer to evaluate the psychological and biochemical parameters. Daily data of the latter are evaluated through the reconstruction of hypothetical harmonic curves. As a first example of the study of tolerance to drugs in schizophrenia, Dr. Stancer, Dr. Quarrington and Dr. L. Woods are developing methods for the investigation of insulin tolerance in schizophrenic patients. They are developing the use of an Auto-Analyser for the *in vivo* measurement of glucose in response to the injection of insulin. The resultant curves will be analysed by mathematical means. This study has been initiated by reports from other centres of abnormal insulin tolerance in schizophrenia.

Under the supervision of Dr. H. C. Stancer in the neurochemical laboratory, Mr. A. Zachwieja and Mrs. V. Grant have completed the setting up of methods for the quantitative and qualitative measurement of phospholipids in blood and cerebrospinal fluid. The methods are being used to assess the results obtained for different preparations of red and white cells of normal blood. Arrangements have been completed for the transfer of mentally retarded children to the Clinical Investigation Unit for investigation of the phospholipids of their cerebrospinal fluid.

Dr. Lovett Doust's enquiries into the psychophysiological properties of a biological clock specific to certain psychiatric disorders are continuing in the research laboratories of Toronto Psychiatric Hospital. A hundred retarded children have been examined through the courtesy of the Metropolitan Toronto Association for Retarded Children and the endogenous rhythms of these children have been contrasted with those of a small group of mentally healthy children of comparable age and sex ratio.

The programme calls for the investigation of further groups of psychiatrically affected children: specifically neurologically normal autistic children and those with spastic and athetoid forms of cerebral palsy in an attempt to distinguish between biological rhythms characterizing psychosis and retardation with and without concomitant brain damage.

Groups of adult patients have also been under review. One group with manic-depressive psychosis (type *folie circulaire*) has been studied psychophysiologically. Serial investigations of autonomic balance suggest a pattern of progressive dysequilibrium which leads to the affective change. Preliminary results indicate that tri-iodothyronine administration acts as a mood stabilizer in the presence of appropriate psychotropic drugs. Another group studied consists of patients with atypical schizophrenic syndromes and cerebral dysrhythmia. Patients with this condition can be readily identified by their non-schizophrenic biological clock pacemaker setting and are commonly not helped by tranquillizing drugs. Therapeutic trials of a new chemical agent are in progress. A third group of patients under active investigation has been an alcoholic one. The affective cycle of a small number of long-term alcoholics suggests that depression precedes the urge to resume drinking in certain of them. Attempts to define the timing of the affective change are under way so that trials of anti-depressant medication may be given.

More recently, a number of research programmes have been initiated in the laboratories at Ontario Hospital, Toronto. With Dr. B. A. Cookson, urinary and salivary electrolyte balances in patients with periodic affective disorders are being studied kinetically. Preliminary results suggest that circadian rhythm disturbances in the output of potassium appear to have relevance to affective swings in these patients.

Instrumentally, the laboratories have added a variety of new pieces of equipment. With Mr. A. Luft, a pilot model of a photoelectric spectroscopic recording oximeter has finally emerged from the development stage. With Mr. J. Mourant, experience has been gained with the rheoencephalograph and its capacity to provide an analogue recording of cerebral blood flow in man. With Mr. I. Podnieks, a variety of new closure and Gestalt-type psychological tests have been added to the serial test battery. With Mr. L. Keltz, development of an electronic frequency analyser is in progress. With Dr. M. Schaeffer of the Faculty of Music, preliminary enquiries into the possible psychophysiological effects of pure tones of differing frequencies and wave forms have been started.

Psychological research has been actively pursued. Dr. B. Quarrington has continued his long range studies of the psychological rhythms of healthy subjects. His enquiries have included periodic cycles of feeling state and social attitudes and attempts have been made to relate these to other expressions of rhythmic activity. A study of association with menstrual cycles and another with variations in introversion have been completed. Patients with recurrent psychiatric disturbances have been examined and a method worked out whereby data obtained from biochemical, psychiatric, and psychological investigation of such patients can be examined by time series analysis. Patients who stutter have also been investigated. Experiments to test the approach-avoidance conflict theory and the reliability of clinical judgment have been carried out. With Dr. H. N. McLeod, an evaluation of the Grassi test as a measure of organic brain pathology has been completed.

In the section of psychodynamics, Dr. D. Cappon has continued his studies on orientational percept distortion. A positive feedback method of measuring time, space, and weight perception has been developed, and a questionnaire designed to compare healthy controls with certain types of psychiatric patients has confirmed that these groups may be reliably distinguished on the basis of perceptual differences. Similar differences have also been noted when conditions of reduced sensory input have been used and spontaneous body movements measured with a bed seismograph.

In the field of clinical research, a wide variety of studies have been pursued. Dr. D. J. McCulloch and the out-patient staff of Ontario Hospital, Toronto have completed a long-term investigation of the psychiatric out-patient. They are engaged

now in writing a book which will summarize the results of their enquiries into the factors determining change during psychotherapy, the variables of social class and decision taking, and the sexual norms characterizing this class of patient. In the out-patient department of Toronto Psychiatric Hospital, Dr. D. Coates and his staff are investigating the natural history of the schizophrenic patient; Dr. S. Neiger is writing a book on the Rorschach Test; and Dr. R. G. S. Arthurs is examining the clinical and EEG characteristics of youths with psychopathic personalities. In the in-patient department of the same hospital, Dr. A. Bonkalo is studying the re-orientational process in patients receiving electroshock treatment, and Dr. P. Melville has organized an experiment in social relationships on the women's ward. At Toronto Western Hospital, and in collaboration with Dr. J. D. Armstrong and the staff of the Addiction Research Foundation, Dr. E. F. W. Baker has investigated the use of an hallucinogenic drug on a group of alcoholics and is now engaged in a follow-up study of these patients. At Toronto General Hospital, Dr. R. Pos has assembled a research group to examine the possible role of sensory underload in affecting synaptic inhibition in psychiatric patients.

Toronto Psychiatry has reason to be proud of its developing Forensic Department. The impact of the results of research enquiries initiated by Dr. K. G. Gray and his colleagues is already being felt in courts of law. Current research activities include a study of the effects of alcohol on mental function, especially in criminal cases, and a survey of Canadian psychiatrists in regard to psychopathic personality. In the Forensic Clinic, Dr. R. E. Turner and his staff are engaged in analysing a group of nearly 600 sexual offenders and a group of 100 youthful offenders, all of whom appeared before Toronto courts. The use of the Clinic as a focus for statutory referrals is being examined with Mrs. M. Jerry, while Mr. A. Gigeroff has completed a genealogical survey involving sexual deviation and the legal process. Drs. J. W. Mohr and C. K. McKnight are studying homicide in relation to mental illness while Drs. Turner and R. E. Stokes are concerned with this relationship in the assaultive patient. In the area of treatment, Dr. H. Hutchison continues his investigation of the use of reciprocal inhibition therapy in sexual deviants.

Research with children is a feature of many centres within the Department of Psychiatry. Selected for mention this year is a group of studies sponsored by Dr. J. D. Atcheson and the staff of Thistletown Hospital. Outstanding among these studies are a cluster dealing with childhood schizophrenia. The investigations are centered upon fifty children with this disabling condition. Among the research techniques employed is the use of closed circuit television. Also at Thistletown, Dr. H. R. Alderton has been refining a rating scale for the measurement of disturbed behaviour.

PUBLICATIONS

- ALDERTON, H. R. "Reactive Psychosis in Adolescence" (*Canadian Psychiatric Association Journal*, vol. 8, no. 4, Aug., 1963, pp. 255-66).
- ALDERTON, H. R. and HODDINOTT, B. A. "A Controlled Study of the Use of Thioridazine" (*Canadian Psychiatric Association Journal*, vol. 9, no. 3, June, 1964, pp. 239-47).
- ARTHURS, R. G. S. and CAHOON, E. B. "A Clinical and Electroencephalographic Survey of Psychopathic Personality" (*American Journal of Psychiatry*, vol. 120, no. 9, March, 1964, pp. 875-7).
- ARTHURS, R. G. S. *et al.* "Grief Reaction" (*Bulletin of the Academy of Medicine, Toronto*, vol. 37, no. 4, Jan., 1964, p. 64 and no. 6, March, 1964, pp. 100-3).
- BERG, J. M. "Developing our Potentials through Total Programming" (*Mental Retardation*, vol. 13, no. 4, Dec., 1963, pp. 4-10).
- BOOTHROYD, W. E. "The Female Drug Addict: A Profile" (*Addictions*, vol. 10, no. 2, autumn, 1963, pp. 36-40).
- "A Religious Perspective on Alcohol, Some Introductory Comments" (*ibid.*, pp. 2-3).
- CAPPON, D. "Group Therapy in Private Practice" (*American Journal of Psychotherapy*, vol. 17, no. 2, April, 1963, pp. 213-29).
- "Results of Psychotherapy" (*British Journal of Psychiatry*, vol. 110, Jan., 1964, pp. 35-45).
- CAPPON, D., with BANKS, R. K. "Developmental Deprivation and Mental Illness: A Study of 20 Questions" (*Child Development*, vol. 34, no. 3, Sept., 1963, pp. 709-18).

- FOTHERINGHAM, J. B. "Mental Retardation Unit" (*Canada's Mental Health*, vol. 12, no. 1, Jan.-Feb., 1964, pp. 14-5).
- GRAY, K. G. "Mental Illness, including Alcoholism and Senility, and Admission to and Discharge from Public and Private Institutions"; in *Law Society of Upper Canada, Special Lectures*, 1963, pp. 1-13. Toronto: Richard de Boo. 1963.
- "A Psychiatrist Looks at the Court" (*Criminal Law Quarterly*, vol. 6, no. 1, June, 1963, pp. 86-92).
- GREENLAND, C. "Family Care of Mental Patients" (*American Journal of Psychiatry*, vol. 119, no. 10, April, 1963, p. 1000).
- "Richard Maurice Bucke, M.D." (*Canada's Mental Health*, vol. 11, no. 5, May, 1963, pp. 1-5).
- "Richard Maurice Bucke, Psychiatrist and Philosopher"; in *Catalogue to R. M. Bucke Exhibition*. Toronto. 1963. Pp. 20.
- "Thinking about Mental Retardation" (*Social Worker*, vol. 32, no. 2, pp. 25-8).
- "The Treatment of the Mentally Retarded in Ontario—An Historical Note" (*Canadian Psychiatric Association Journal*, vol. 8, no. 5, Oct., 1963, pp. 328-36).
- LEWIS, D. J. "A Psychiatrist Looks at Religion" (*Anglican Dialogue*, vol. 2, no. 2, 1963, pp. 21-9).
- LOVETT DOUST, J. W. "Biological Clocks" (*Canadian Psychiatric Association Journal*, vol. 9, no. 3, June, 1964, pp. 210-20).
- LOVETT DOUST, J. W. and FOTHERINGHAM, J. B. "The Effects of Maternal Stress on the Fetal Heart Rate"; in *Recent Advances in Biological Psychiatry*, pp. 13-23. New York: Plenum Press. 1963.
- MOHR, J. W. "Notes on the Interaction between the Medical and Social Sciences" (*Criminal Law Quarterly*, vol. 6, no. 4, June, 1963, pp. 112-15).
- "Prison or Hospital—Some Problems in the Relationship between Criminal Law and Mental Illness" (*Canadian Psychiatric Association Journal*, vol. 9, no. 2, April, 1964, pp. 101-10).
- "A Short Survey of Sexual Offenders in Kingston Penitentiary" (*Canadian Journal of Corrections*, vol. 5, no. 3, July, 1963, pp. 180-7).
- "Terminology and Nosology: A Central Problem in Research of Criminal Phenomena" (*ibid.*, no. 4, Oct., 1963, pp. 229-35).
- MCCULLOCH, D. J. "Notes on Communication in a Mental Hospital" (*Canadian Psychiatric Association Journal*, vol. 9, no. 1, Feb., 1964, pp. 46-50).
- "Some Observations on the Group Process in the Staff of an Outpatient Clinic"; in *Proceedings of the Third World Congress on Psychiatry*, vol. 3, ed. R. A. Cleghorn *et al.*, pp. 171-4. Toronto and Montreal: University of Toronto Press and McGill University Press. 1964.
- PARKIN, A. "On Fetishism" (*International Journal of Psychoanalysis*, vol. 44, part 3, July, 1963, pp. 352-61).
- "On Sexual Enthralment" (*Journal of the American Psychoanalytic Association*, vol. 12, no. 2, April, 1964, pp. 336-56).
- POS, R. *The Psyche-Some Complex: Its Psychology and Logic*. The Hague: Immig-Lankhout, N.V. 1963. Pp. xi, 244.
- QUARRINGTON, B. and CONWAY, J. "Positional Effects in the Stuttering of Contextually Organized Verbal Material" (*Journal of Abnormal and Social Psychology*, vol. 67, no. 3, Sept., 1963, pp. 299-303).
- RICHARDS, B. W. "Institutional Care of the Mentally Retarded in Great Britain" (*Canada's Mental Health*, supplement no. 39, vol. 12, no. 1, Jan.-Feb., 1964, pp. 1-9).
- "Observations on Accommodation for the Mentally Retarded in the Province of Ontario" (*Canadian Medical Association Journal*, vol. 89, no. 4, July 27, 1963, pp. 167-70).
- "Recent Advances in Medical Knowledge of Causes of Mental Retardation" (*ibid.*, no. 24, Dec. 14, 1963, pp. 1230-3).
- "Recent Advances in Mongolism" (*Bulletin of the Academy of Medicine, Toronto*, vol. 36, no. 11, Aug., 1963, pp. 202-5).
- TUCHTIE, M. D., with HUTCHISON, H. C., GRAY, K. G. and STEINBERG, D. "A Study of the Effects of Alcohol on Mental Functions" (*Canadian Psychiatric Association Journal*, vol. 9, no. 1, Feb., 1964, pp. 33-42).

RADIOLOGY

Under the direction of Professor M. R. Hall

There has been no essential change in the undergraduate or postgraduate teaching in the department during the past year. The postgraduate course leading to the Diploma in Medical Radiology continues to attract postgraduate students, and it is a pleasure to report that seven candidates have obtained their D.M.R. diplomas this year.

We regret that Dr. E. H. Shannon has retired as Assistant Professor and Director of the Department of Radiology at St. Michael's Hospital. Dr. B. L. Bird has been appointed as Assistant Professor of Radiology and Head of the Department to succeed Dr. Shannon.

During the year 1963-64, in addition to routine duties, members of the staff gave lectures and papers to other than local groups, as follows. A. BRUCE-ROBERTSON, A. S. MCFARLANE, and W. D. RIDER: "Acute Alterations of Plasma Protein Metabolism Following Therapeutic Irradiation," the Canadian Society for Clinical Investigation, Edmonton, Alberta. R. S. BUSH, and W. R. BRUCE: "The Radio-sensitivity of Murine Lymphoma Cells *In Vivo* as Determined by a Splenic Colony Method," the Radiation Research Society, Milwaukee, Wisconsin. P. J. FITZPATRICK: "Common Complications Encountered in Radiotherapy and Their Treatment," the Sault Ste Marie Clinic. R. B. HOLMES: "Calcifications of the Heart," McGill University, Montreal; on "Television X-Ray Image Amplification," the Society of Motion Picture and Television Engineers, Boston, Massachusetts. H. E. MEEMA, *et al.*: "Measurable Roentgenologic Changes in Some Peripheral Bones in Senile Osteoporosis," the American Geriatrics Society, Montreal. H. E. MEEMA, R. H. SHEPPARD, and A. RAPOPORT. "Roentgenographic Visualization and Measurement of Skin Thickness and Its Diagnostic Application in Acromegaly," the Radiological Society at the Forty-Ninth Annual Meeting, Chicago.

M. V. PETERS: "The Influences Affecting the Control of Carcinoma of the Breast Complicated by Pregnancy or Lactation," the New York Obstetrical Society and New York Cancer Society. R. M. PARRISH: "Operative Cholangiography," the Combined Meeting of the Rochester, Buffalo and Toronto Radiological Society, Toronto. D. E. SANDERS: "Advances in Radiological Techniques," the Medical Alumni of the University of Toronto; on "New Aids in Radiological Diagnosis," the Women's College Hospital, Toronto. W. J. K. SIMPSON: "Self-Realization," at the Norwell District Secondary School Graduation Exercises (Baccalaureate Address), Palmerston, Ontario; on "Non-Surgical Treatment of Cancer," the Registered Nurses' Association (District No. 9, West Algoma), Advanced Nursing Education Series, Sault Ste Marie, Ontario; on "Radiostrontium Scans and Early Diagnosis of Bone Metastases," the Three City Radiological Meeting (Rochester, Buffalo, Toronto) in Toronto.

RESEARCH

Dr. J. H. Gardiner is continuing his studies on the temporo-mandibular joints. Drs. R. B. Holmes and E. L. Lansdown are continuing their research on radiologic aspects of coronary artery disease. Dr. A. Humphry is pursuing the investigation concerning the occurrence of congenital anomalies of the urinary tract associated with congenital anomalies of the heart. Dr. H. E. Meema is continuing his research on cortical bone measurements in metabolic bone disease and has developed a method for visualization and measurement of skin thickness in which he found application in the diagnosis of acromegaly.

Dr. C. A. F. Moes is carrying out an investigation of the total anomalous pulmonary venous drainage into the azygos vein. He is also studying the correlation of knee arthrography with clinical and surgical findings in children. Dr. B. J. Reilly, in conjunction with Dr. D. Fraser and his associates of the Research Institute, Hospital for Sick Children, is investigating the experimental production of cranio-synostosis in rachitic, non-rachitic, and control dogs. The first stage of this project has been successfully completed. He is continuing the study of the clinical and radiological correlation of spondylo-epiphyseal dysplasia.

Reported by Dr. C. L. Ash

The research activities of the clinical staff of the Ontario Cancer Institute have continued with the support of grants by the Ontario Cancer Treatment and Research

Foundation amounting to \$73,393 and \$4,400 by the Defence Research Board. Current projects are as follows: 1. Immunization of patients with a diazotized extract of their own tumours. 2. Investigation into ferrokinetics. 3. Clinical trials of chemotherapeutic agents. 4. Study of acute radiation syndrome in man. 5. A Sr^{90} electron beam therapy unit. 6. Erythropoiesis in human beings with neoplastic disease. 7. Immunotherapy in the management of choriocarcinoma. 8. Development and clinical trials of an improved body scanner.

PUBLICATIONS

- HOLMES, R. B. *et al.* "Cine Venography of the Lower Extremity" (*Journal of the Canadian Association of Radiologists*, vol. 15, no. 1, March, 1964, pp. 27-33).
- KRUYFF, EVERT and MUNN, J. D. "Further Experiences with a New Sign in Posterior Fossa Tumors" (*Journal of the Canadian Association of Radiologists*, vol. 14, no. 3, Sept., 1963, pp. 116-17).
- LLEWELLYN-THOMAS, E. and LANSDOWN, E. L. "Visual Search Patterns of Radiologists in Training" (*Radiology*, vol. 81, no. 2, Aug., 1963, pp. 288-92).
- MEEMA, H. E. "Cortical Bone Atrophy and Osteoporosis as a Manifestation of Aging" (*American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 89, no. 6, June, 1963, pp. 1287-95).
- MEEMA, H. E. *et al.* "Measurable Roentgenologic Changes in Some Peripheral Bones in Senile Osteoporosis" (*Journal of the American Geriatrics Society*, vol. 11, no. 12, Dec., 1963, pp. 1170-82).
- MEEMA, H. E., SHEPPARD, R. H. and RAPOPORT, A. "Roentgenographic Visualization and Measurement of Skin Thickness and Its Diagnostic Application in Acromegaly" (*Radiology*, vol. 82, no. 3, March, 1964, pp. 411-17).
- MOES, C. A. F. "Spondylarthritis in Childhood" (*American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 91, no. 3, March, 1964, pp. 578-87).
- MOES, C. A. F. and HENDRICK, E. B. "Diastatomyelia" (*Journal of Pediatrics*, vol. 63, no. 2, Aug., 1963, pp. 238-48).
- PETERS, M. V. "The Contribution of Radiation Therapy in the Control of Early Lymphomas" (*American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 90, no. 5, Nov., 1963, pp. 956-67).
- REILLY, B. J., FRASER, D. *et al.* "Craniosynostosis in the Rachitic Spectrum" (*Journal of Pediatrics*, vol. 64, no. 3, March, 1964, pp. 396-405).
- REILLY, B. J. and MUNN, J. D. "Metaphyseal Dysostosis" (*Journal of the Canadian Association of Radiologists*, vol. 14, no. 2, June, 1963, pp. 84-94).
- RIDER, W. D. "Radiation Damage to the Brain—A New Syndrome" (*Journal of the Canadian Association of Radiologists*, vol. 14, no. 2, June, 1963, pp. 67-69).
- SIMPSON, W. J. and BAKER, R. G. "Total-Body Scanning"; in *Proceedings, Symposium in Medical Radioisotope Scanning, Oak Ridge Institute of Nuclear Studies, 1962*, pp. 205-35, U.S. Atomic Energy Commission, 1963.
- WORTZMAN, G. "Roentgenologic Aspects of Extradural Hematoma" (*American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 90, no. 3, Sept., 1963, pp. 462-71).

SURGERY

Under the Direction of Professor F. G. Kergin

The members of the Department continue to be productive in experimental research, as well as in clinical studies. Much of the experimental work is done in the laboratories of The Banting Institute, using space which was considered adequate in 1929, but which is grossly inadequate in 1964. It is a tribute to the devotion and determination of the individual researchers that they manage to produce in spite of inconvenience and over-crowding.

The University is aware of this problem and we are encouraged by the fact that a committee, appointed by the Board of Governors, is studying the necessary expansion of facilities and is expected to submit a strong report very shortly.

It has been evident for a good many years that members of the Department who are on the staff of teaching hospitals, other than the Toronto General Hospital, can only carry on experimental work successfully if research facilities are available

in or very close to their home hospitals. The Toronto Western Hospital has, over several years, developed its own research laboratories; St. Michael's Hospital is constructing laboratories, as is the Wellesley Hospital, in their present building programmes. The very extensive new laboratories of the Research Institute of the Hospital for Sick Children have been completed during the year and Dr. Walter Zingg has joined the Department of Surgery of that hospital as Director of Surgical Research.

At the present time the University makes no contribution to the capital costs nor to the upkeep of these facilities. An important point of policy to be considered and settled is in what way and to what degree these academic endeavours on the part of the hospitals should receive financial support from the University.

The present second medical year is the first of the enlarged classes to reach the clinical phase of teaching. To keep clinic groups at approximately their present size, as of next academic year the classes will be divided into twenty groups instead of the present sixteen. To relieve this increased teaching load, and to protect the patients in the teaching wards from over-exposure to students, surgical teaching of second and third year groups will commence at the New Mount Sinai Hospital in the autumn of 1964. Dr. D. R. Bohnen, Surgeon-in-Chief, has arranged with the Trustees of the hospital for a closed teaching unit of thirty-two beds and a group of highly qualified members of the Department of Surgery of the hospital are being given University appointments. We welcome them to this Department.

In October, Mr. R. S. Handley, accompanied by Mrs. Handley and their daughter Rosemary, spent three weeks with the Department as the annual Middlesex Visitor. His interests in Surgery are catholic, and he entered very fully into the activities of the various divisions of the Department, and also, in a formal lecture, shared with us his special knowledge of cancer of the breast.

The Balfour Lecture was given on March 10, by Dr. John W. Kirklin of Rochester, Minnesota. Dr. Kirklin, who is head of a Division of Surgery at the Mayo Clinic, is one of the great cardiovascular surgeons of the world. In his lecture he reviewed briefly some of the important recent developments in this field as well as expressing something of the philosophy of a surgeon who is pioneering new and very high-risk surgical procedures on crippling and potentially lethal cardiac lesions. The lecture was greatly appreciated by a capacity audience of students, residents, and staff. As an innovation this year, and which we hope will become a custom, the Balfour Lecturer spent three days with us as a Visiting Professor of Surgery.

During February Dr. Charles Drake of London, Ontario, spent a week with the Department as a Visiting Professor of Neurosurgery. He visited the various Divisions of Neurosurgery in the teaching hospitals and in addition to teaching our students, spent much of his time with the residents-in-training. His astute observations and wise discussions were appreciated by all levels of staff.

The Cardiovascular Travel Club of the north central area of the continent is a small group of distinguished cardiovascular surgeons. The group spent two days in January visiting the Toronto General Hospital and the Hospital for Sick Children.

During the year there have been many distinguished visitors to the Department. Professor J. H. Louw of Cape Town spent a week with us and gave two excellent lectures on gastro-duodenal surgery; one sponsored by the Division of Postgraduate Medical Education and the other by the Academy of Medicine. Professor Wilfrid Caron of Laval University, on the occasion of his giving the Marlow Lecture to the Academy of Medicine, spent several days visiting the Departments of Surgery in the teaching hospitals. Mr. Ronald Belsey, senior thoracic surgeon to the south-west region of England, with whom several of our staff have had a period of training, made a short visit and gave a lecture on reflux oesophagitis sponsored by the Division of Postgraduate Medical Education. We have also had visits from Dr. J. R. Magarey of Adelaide, Australia, Major General G. A. Stephen, Director of Surgery of the British Army, Dr. Yuri Antonov, Surgeon-in-Chief of the Botkin Hospital in Moscow, Dr. G. S. Pestell of Perth, West Australia, and many others.

The Department was honoured when Dr. W. G. Bigelow was appointed the Royal College of Surgeons of Canada Lecturer in Surgery for 1964. His masterly lecture on the microcirculation of the blood was very well received.

At the beginning of this academic year Dr. Ian B. Macdonald resigned from his position as Associate Professor and Surgeon-in-Chief of the Wellesley Hospital to take up an appointment as Director of the Palo Alto Research Foundation. This new appointment will give him an opportunity to satisfy his desire to pursue surgical research. The Foundation is fortunate to have available his outstanding administrative ability.

During the year Dr. Hugh Coulthard retired from the active staff of the Department after an association of many years. Many classes of students will remember the excellent teaching demonstrations of patients with surgical tuberculosis which Dr. Coulthard has given at the Toronto Hospital at Weston. His teaching ability will continue to be available in his capacity as a Graduate Lecturer. Dr. Godfrey Gale, who succeeded Dr. Coulthard as staff surgeon at the Toronto Hospital, has been appointed a clinical teacher.

Dr. George Stobie has resigned from the Department and from his position in charge of surgical research at the Research Institute of the Hospital for Sick Children, to take up a research appointment at the Ford Hospital in Detroit.

RESEARCH

Cardiovascular Surgery

Dr. R. J. Baird has completed a study of all the cases of bleeding oesophageal varices treated surgically at the Toronto General Hospital up to March 1964, and has reported the results. He has also reviewed all the patients who have had open-heart repair of the aortic valve. With the help of Dr. I. H. Lipton he has done an experimental study of the use of the N.R.C.-Vogelfanger stapler as an instrument for suturing autogenous vein grafts. A continuing study of the role of venous pressure in the determination of arterial blood flow in the limbs of the dog is in progress.

Dr. W. G. Bigelow has directed Dr. D. C. McGregor in a continuing study of the protective effect of the monovalent alcohols during hypothermia and experimental heterotransplantation of the hibernating gland of the groundhog. A follow-up examination of patients who have had transplantation of an aortic valve homograft has been completed.

Dr. R. O. Heimbecker has been assisted by Dr. A. Madani in carrying on the experimental studies reported last year. The synthetic arterial grafts of high porosity, used in a two-stage method, have proved to be highly successful in the experimental animal and have had a clinical trial. A similar technique is being applied to synthetic heart valves experimentally. The work on the production of a sublethal infarct in the dog's heart, followed by its excision, has been continued and very complete studies of the performance of these hearts have been completed. Dr. Heimbecker has also continued his study of cineradiographic recording of the heart valves, diseased, repaired, or replaced, using a pulse duplicator applied to human post-mortem hearts. Work on a disposable film type oxygenator continues.

Dr. H. F. Robertson has been carrying out extensive observations of the effects of hyperbaric oxygen at three atmospheres on dogs. He has shown that this treatment does not produce better survival after coronary artery ligation. His studies are leading to some interesting conclusions regarding the nature of "oxygen poisoning."

At the Hospital for Sick Children, Drs. W. T. Mustard and G. A. Trusler, assisted by Dr. E. C. Ward, have continued to be active in research. Dr. Mustard has made observations on the effect of banding the pulmonary artery and of producing pulmonary valve stenosis in the dog, both in regard to raising the pressure in the right ventricle and to producing changes in the artery itself. He also determined that pericardium introduced into the interatrial septum of piglets does grow with the growth of the animal. His attempts to develop a membranous type oxygenator suitable for use with infants have met with technical difficulties which are not yet solved.

Dr. Trusler has been successful in developing a preparation for producing acute failure of the canine heart and has investigated the effect of THAM on the acidosis which results. With Dr. M. Srouji, he has done a clinical study of the paradoxical hypertension which follows correction of coarctation of the aorta. They have confirmed the high urinary excretion of VMA which results, but conclude that this is not related to the hypertension nor, specifically, to the repair of the coarctation.

At St. Michael's Hospital, Dr. W. Sapirstein has continued the experimental work reported last year. He is now investigating the effects on lung function and the pulmonary vasculature of the cardiac by-pass technique formerly described. The clinical follow-up study of patients subjected to thromboendarterectomy for occlusive femoral-popliteal disease is continued.

At the Toronto Western Hospital, Dr. D. R. Wilson, assisted by Dr. H. B. Mandell, has continued his investigation of the sequestration of blood during extracorporeal circulation. They have also studied the cause and prevention of reduced arterial pressure, falling venous return, increased portal pressure, and reduced inferior vena cava blood oxygen tension during total body perfusion with homologous blood.

General Surgery

Dr. D. R. Bohnen, at the New Mount Sinai Hospital, is investigating the physical laws applicable to the flow of fluid in small blood vessels and is also carrying out a clinical study of methods of repair of large abdominal hernias.

At the Toronto General Hospital, Dr. N. C. Delarue has been assisted by Dr. D. W. Strangway in a number of investigations. The follow-up study of patients who had been found to have cancer cells in their blood has been completed and reported. The large scale study of sputum cytology in individuals considered to be vulnerable to lung cancer is being continued in collaboration with the Department of Pathology. An evaluation of open lung biopsy has been made.

At the Women's College Hospital, Dr. E. B. Fish has commenced a study of urinary oestrogens in patients suffering from breast cancer.

At the Toronto Hospital, Weston, Dr. Godfrey Gale is doing an appraisal of the results obtained by "salvage resections" in patients treated for pulmonary tuberculosis and also is evaluating a method of determining blood levels of isoxyl.

Dr. J. A. MacDonald is investigating various factors which affect the ability of malignant tumours to metastasize in the experimental animal.

Dr. N. T. McPhedran, assisted by Dr. A. E. Gross and in collaboration with Dr. H. D. Bett of the Connaught Medical Research Laboratories, has continued his attempts to extract from the pancreas a gastric stimulating factor. Results to date are inconclusive. He has also continued a clinical study of gastric cooling as a means of controlling severe bleeding, using the simple apparatus which he and Dr. R. D. Henderson invented.

Dr. J. E. Mullens continues to collaborate with the staff of the Ontario Veterinary College and they have turned their attention to an investigation of fluorescent antibodies in the mucosa of the rectum and colon in health and disease.

Dr. F. G. Pearson has continued his experimental study of methods for reconstruction of the trachea. Attempts to use an intercostal muscle graft were not successful but heavy marlex mesh has been satisfactory, in the experimental animal, and has been used successfully in a human patient. He has continued to develop the technique of mediastinoscopy and has assessed the results obtained in a large series of patients.

At the Hospital for Sick Children Dr. B. Shandling has continued his histological studies of Hirschsprung's disease and is conducting a clinical study of the effect of antibiotic therapy in children treated for appendicitis with perforation.

Neurosurgery

At the Toronto Western Hospital, Dr. Ross Fleming has made and reported a clinical study of traumatic lesions of the optic nerve and chiasm and of the effects of thalamotomy in non-Parkinsonian dyskinesias.

At the Hospital for Sick Children, Dr. E. B. Hendrick has completed a detailed follow-up study of a very large number of children who had suffered head injury and is investigating post-traumatic epilepsy in children.

Dr. W. J. Horsey and Dr. S. Schatz, at St. Michael's Hospital, are making a clinical study of cervical discotomy and fusion by the anterior approach. Dr. Schatz has also investigated the relationship of gastro-intestinal ulceration and bleeding to intracranial disease or injury.

At The Banting Institute, Dr. G. Khododad has been directed by Dr. W. M. Lougheed in the successful development of a technique for micro-suture of arteries down to the 1.5 to 2 mm. range and Dr. Lougheed has been successful in applying this method to a human patient suffering from cerebral embolism.

Dr. T. P. Morley has received a grant from the Bickell Foundation to establish a cerebral aneurysm registry and conduct a follow-up study. With the late Professor Olszewski he has supervised Dr. C. H. Tator in a study in depth of the uptake by brain tumours of radioactive materials. Professor A. C. Ritchie is now co-sponsor of this research.

Dr. R. R. Tasker has been assisted by Dr. A. Kertesz in an experimental study of the tremor producing drug Tremorine and the area of brain affected has been elucidated, in part. He has continued his clinical study of patients suffering from Parkinson's disease and other dyskinesias and has evaluated the results obtained by stereotactic operations. A new method of analgesia for use during these operations has been evolved and reported.

Orthopaedic Surgery

At St. Michael's Hospital, Dr. J. G. Evans has continued his study of mortality associated with fractures of the hip.

Dr. J. E. Hall has turned his attention to the development of improved prostheses for children. He is directing a research and development project at the Crippled Children's Centre with support from a Federal Health Grant.

Dr. W. R. Harris, with Dr. A. Halmagyi, has studied in the laboratory the uptake of tritiated thymidine by normal epiphyseal plates and by transplanted autogenous and homogenous plates. Attempts have been made to increase the growth of long bones by transplanting epiphyseal plates to the middle of the shaft, with inconclusive results to date.

Dr. Ian Macnab has directed Dr. J. M. Aubin in an experimental study of the use of partially deproteinized bone as a heterograft to bridge a bone defect. Although acceptable, these grafts are not as valuable as autografts. The deproteinization process does appear to accelerate the acceptance and incorporation of homogenous grafts.

At the Research Institute of the Hospital for Sick Children, Dr. R. B. Salter has supervised and collaborated in a variety of orthopaedic research projects. Assisted by Dr. S. Dallas, he has extended the work reported last year on the effect on the femoral head of young pigs of immobilization in forced abduction. The pathological process involved in the resulting deformity of the head, the duration of ischaemia necessary for death of osteocytes and the process of revascularization of the avascular femoral head have been studied. With Dr. R. J. Carbin, Dr. Salter has investigated the effect produced in the knee joint of the rabbit by introducing various biological substances into the joint. With Dr. Patrick Fyfe, a clinical study is being made of the results obtained in children suffering from cerebral palsy by various types of operation designed to correct muscle imbalance. With Dr. C. Zaltz, a study has been conducted which has resulted in a new concept of the pathological anatomy in the condition described as "pulled elbow" in children. With Dr. J. Wardill, a study of the results obtained in various types of epiphyseal plate injuries has been made and has lead to conclusions in regard to the best methods of treatment and the prognosis.

At the Toronto Western Hospital, Dr. A. M. Wiley has continued his work on an experimental model designed to produce osteoarthritis and has attempted to modify the course of the degenerative joint changes by a variety of manoeuvres.

Plastic Surgery

Dr. W. K. Lindsay in the research laboratories of the Hospital for Sick Children, and with the assistance of Dr. D. C. Birdsell, has continued his exhaustive studies of the healing of tendons and the factors which affect restoration of function. They have undertaken a detailed macroscopic injection study of the blood supply of the flexor digitorum profundus tendons in chickens, monkeys, and the human. They have made a study of collagen production in normal, immobilized and healing tendons, and also have continued the study of the results obtained with interposition substances and by a variety of suturing techniques.

Dr. H. G. Thomson, at the same institution, is studying pigment tattooing in piglets and conducting clinical studies of spectroscopic colour matching of port wine stains and of the results obtained by cross-finger pedicle grafts.

Urology

At St. Michael's Hospital, Dr. V. Colapinto has begun a clinical study of the effects of treating bladder tumours by local applications of Thiotepea.

Dr. P. O. Crassweller, at the Toronto Western Hospital, in collaboration with Dr. A. Rapoport and with the assistance of Dr. J. F. Ward, has investigated certain metabolic parameters which may be factors in urinary stone formation. Variations in the production of urinary ammonia and titratable acidity in both the normal human and stone-formers are being assessed. Comparative studies of the function of the normal kidney and an autotransplanted kidney in the dog are being made using a technique in which the bladder trigone is marsupialized to permit independent kidney function studies.

Dr. R. D. Jeffs, at the Hospital for Sick Children, has been assisted by Dr. Lavina Lickley in his study of induced pyelonephritis in the experimental animal. A clinical study has been made, with Dr. J. P. Philippedziz, of voiding pressure and flow rates as a means of assessing urethral resistance.

In the laboratories of The Banting Institute, Dr. W. K. Kerr has directed Dr. P. E. Levers in a continuation of the investigation which he and Dr. M. Barkin had previously conducted into the presence of carcinogenic metabolites of tryptophan in the urine of patients with tumours of the kidney or bladder. They have confirmed that these metabolites disappear from the urine when the diseased organ is removed. The biochemical role of cigarette smoking in the aetiology of bladder tumours is also under study.

PUBLICATIONS

- BAIRD, R. J., FIROR, W. B. and BARR, H. W. K. "Protection of Renal Function during Surgery of the Abdominal Aorta" (*Canadian Medical Association Journal*, vol. 89, no. 14, Oct. 5, 1963, pp. 705-8).
- BAIRD, R. J. and MIYAGISHIMA, R. T. "The Danger of Air Embolism through Pressure-Perfusion Cannula" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 46, no. 2, Aug., 1963, pp. 212-19).
- BAIRD, R. J., MIYAGISHIMA, R. T. and LABROSSE, C. J. "Vasodilating Action of Intra-Arterial Oxygen Emboli" (*Archives of Surgery*, vol. 88, no. 1, Jan., 1964, pp. 23-35).
- BIGELOW, W. G., BASIAN, H. and TRUSLER, G. A. "Internal Mammary Artery Implantation for Coronary Heart Disease" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 45, no. 1, 1963, pp. 67-79).
- BIGELOW, W. G. and THOMAS, G. W. "Restenosis Following Mitral Valvoplasty" (*Canadian Medical Association Journal*, vol. 89, no. 16, Oct. 19, 1963, pp. 810-13).
- BULL, C., HOEKSEMA, T., DUCKWORTH, J. and MUSTARD, W. T. "An Experimental Study of the Growth of Arterial Anastomoses" (*Canadian Journal of Surgery*, vol. 6, no. 3, July, 1963, pp. 383-91).
- DELARUE, N. C. "The Hazards of Cigarette Smoking—and What To Do about Them" (*Health Education*, vol. 3, 1964, p. 2).
- Collective review, "The Management of Primary Breast Cancer" (*Surgery, Gynaecology and Obstetrics*, vol. 118, 1964, pp. 133-52).
- "Reconsideration of Some Significant Aspects of the Cigarette Smoking-Lung Cancer Controversy" (*Canadian Medical Association Journal*, vol. 89, no. 25, Dec. 21, 1963, pp. 1277-83).

- DELARUE, N. C. and O'BRIEN, D. F. "Pheochromocytoma: An Important Type of 'Curable Hypertension': A Report of 11 Cases and a Review of the Literature" (*Canadian Journal of Surgery*, vol. 6, no. 3, July, 1963, pp. 259-75).
- FARMER, A. W. and SHANDLING, B. "Review of Burn Admissions, 1956-60—The Hospital for Sick Children, Toronto" (*Journal of Trauma*, vol. 3, no. 5, Sept., 1963, pp. 425-32).
- FLEMING, R. "Surgical Relief of Intractable Pain" (*Applied Therapeutics*, vol. 5, no. 11, Nov., 1963, pp. 958-62).
- GALE, G. L. and KERR, W. K. "Incidence and Management of Tuberculosis Strictures of the Urinary Tract" (*Canadian Journal of Surgery*, vol. 7, no. 2, April, 1964, pp. 111-20).
- GIBSON, D. A. "Osteochondritis Dissecans" (*Canadian Journal of Surgery*, vol. 6, no. 3, July, 1963, pp. 356-8).
- GIBSON, D. A. and HASTINGS, D. E. "Rupture of Triceps Tendon in Adolescence" (*Canadian Journal of Surgery*, vol. 7, no. 1, Jan., 1964, pp. 67-9).
- GORDON, S. D. "History of Plastic Surgery" (*Ontario Medical Review*, vol. 30, no. 8, Aug., 1963, pp. 539-40).
- "Temporo-Mandibular Joint Subluxations and Luxations" (*Canadian Journal of Surgery*, vol. 6, no. 4, Oct., 1963, pp. 433-8).
- GORDON, S. D. and KEY, J. A. "Treated Dermis as an Arterial Substitute: Final Report" (*Journal of Plastic and Reconstructive Surgery*, vol. 32, no. 4, Oct., 1963, p. 476).
- HALL, J. E. "Habilitation of Patients with Congenital Malformations Associated with Thalidomide: Surgery of Limb Defects" (*Canadian Medical Association Journal*, vol. 88, no. 19, May 11, 1963, pp. 964-72).
- HALL, J. E. and SILVERSTEIN, E. A. "Acute Haematogenous Osteomyelitis" (*Paediatrics*, vol. 31, no. 6, June, 1963, pp. 1033-8).
- HARRIS, W. R. "Amputations and Prostheses: The New Look" (*Medical Services Journal, Canada*, vol. 19, no. 9, Oct., 1963, pp. 774-5).
- HARRIS, W. R. and SILVERSTEIN, E. A. "Partial Amputations of the Foot: A Follow-up Study" (*Canadian Journal of Surgery*, vol. 7, no. 1, Jan., 1964, pp. 6-11).
- HEIMBECKER, R. O., BAIRD, R. J., LAJOS, T. Z., VARGA, A. T. and GREENWOOD, W. F. "Homograft Replacement of the Human Mitral Valve: A Preliminary Report" (*Canadian Medical Association Journal*, vol. 86, no. 18, May 5, 1962, pp. 805-9).
- HEIMBECKER, R. O., VARGA, A. T. and McMEEKAN, J. "The Heat Exchanger in Extracorporeal Circulation" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 43, no. 4, April, 1962, pp. 465-72).
- HENDRICK, E. B. and CONEN, P. G. "Recovery from a Cerebral Aspergillus Abscess Metastatic from a Primary Focus in the Lung" (*Canadian Journal of Surgery*, vol. 3, no. 3, July, 1963, pp. 352-6).
- KERR, W. K. and BARKIN, M. "An Aspect of the Vascular Role in the Etiology of Acute Tubular Necrosis" (*Surgery, Gynaecology and Obstetrics*, vol. 116, no. 6, June, 1963, pp. 673-8).
- KERR, W. K., BARKIN, M., D'ALOISIO, J. and MENCZYK, Z. "Biochemical Factors in the Etiology of Carcinoma of the Bladder" (*Cancer*, vol. 16, no. 5, May, 1963, pp. 633-8).
- "Observations on the Movement of Ions and Water across the Wall of the Human Bladder" (*Journal of Urology*, vol. 89, no. 6, June, 1963, pp. 812-19).
- KERR, W. K., BARKIN, M., LATZ, S. and D'ALOISIO, J. "Normothermic Perfusion of the Isolated Dog's Kidney on a Pump Oxygenator System" (*Surgery, Gynaecology and Obstetrics*, vol. 117, no. 2, Aug., 1963, pp. 161-6).
- KERR, W. K., BARKIN, M., TODD, I. A. D. and MENCZYK, Z. "A Hypernephroma Associated with Elevated Levels of Bladder Carcinogens in the Urine: Case Report" (*British Journal of Urology*, vol. 35, no. 3, Sept., 1963, pp. 263-6).
- LINDSAY, W. K. "History of Toronto Plastic Surgery" (*University of Toronto Medical Journal*, vol. 40, no. 6, April, 1963, pp. 233-5).
- LINDSAY, W. K., FIELDING, J. F., FARMER, A. W. and CONEN, P. E. "Cystic Degeneration of Persistent Cervical Thymus: A Report of Four Cases in Children" (*Canadian Journal of Surgery*, vol. 6, no. 2, April, 1963, pp. 178-86).
- MORLEY, T. P. "Notes on Neurosurgery" (*University of Toronto Medical Journal*, vol. 40, no. 6, April, 1963, pp. 230-2).
- "The Need for Nursing Reforms in Ontario" (*Canadian Medical Association Journal*, vol. 90, no. 11, March 14, 1964, pp. 684-6).
- "A Sling Attachment for Skull Calipers" (*Canadian Journal of Surgery*, vol. 7, no. 1, Jan., 1964, p. 103).
- MULLENS, J. H., MCKAY, M. A. and JUBB, K. V. "Experimental Enteritis Produced in Dogs by Escherichia Coli Endotoxin" (*Canadian Journal of Surgery*, vol. 7, no. 1, Jan., 1964, pp. 79-88).
- MUSTARD, R. A. *Fundamentals of First Aid, St. John Ambulance*. Second edition.
- MUSTARD, R. A. and ANDERSON, W. "Malignant Tumours of the Parotid" (*Annals of Surgery*, vol. 159, no. 2, Feb., 1964, pp. 291-304).
- MUSTARD, R. A. and ROSEN, I. B. "Cervical Lymph Node Involvement in Oral Cancer" (*American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 90, no. 5, Nov., 1963, pp. 978-89).

- MUSTARD, W. T. "Anomalous Pulmonary Venous Drainage" (*Heart Bulletin*, Houston, Texas, vol. 13, no. 1, Jan.-Feb., 1964, pp. 8-11).
- "Successful Two-Stage Correction of Transposition of the Great Vessels" (*Surgery*, St. Louis, vol. 55, no. 3, March, 1964, pp. 469-72).
- "Surgery for Ventricular Septal Defects in Infants and Children" (*American Journal of Surgery*, vol. 107, no. 3, March, 1964, pp. 480-5).
- MUSTARD, W. T., FIROR, W. B. and KIDD, L. "Diversion of the Venae Cavae into the Left Atrium during Closure of Atrial Septal Defects" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 47, no. 3, March, 1964, pp. 317-24).
- MUSTARD, W. T., TRUSLER, G. A. and YAO, J. "The Operative Approach to Congenital Aortic Stenosis in Childhood" (*Canadian Medical Association Journal*, vol. 89, no. 21, Nov. 23, 1963, pp. 1068-71).
- PEARSON, F. G. "Mediastinoscopy: A Method of Biopsy in the Superior Mediastinum" (*Canadian Journal of Surgery*, vol. 6, no. 4, Oct., 1963, pp. 423-9).
- PLEWES, B. "The Image of the Doctor" (*Bulletin of the Academy of Medicine*, vol. 37, no. 2, Nov., 1963, pp. 26-31).
- ROBERTSON, D. C., with MATHEWS, R. E. "Naso-Orbital Fractures" (*Plastic and Reconstructive Surgery*, vol. 33, no. 5, May, 1964, pp. 462-5).
- SAPIRSTEIN, W. and BAKER, C. B. "Isolated Tricuspid Valve Stenosis" (*New England Journal of Medicine*, vol. 269, no. 5, Aug., 1963, pp. 236-40).
- SHANDLING, B. and THOMSON, S. "The Cheatle-Henry Approach for Inguinal Herniotomy in Infants and Children" (*Canadian Journal of Surgery*, vol. 6, no. 4, Oct., 1963, pp. 484-8).
- SIMPSON, J. S. and DESJARDIN, J. G. "Neonatal Hirschsprung's Disease: Treatment of Complete Aganglionosis of the Colon by the Duhamel Operation" (*Archives of Surgery*, vol. 87, no. 6, Dec., 1963, pp. 1019-22).
- STEPHEN, C. A. "Proctologic Disorders"; in *Current Paediatric Therapy* by S. Gellis and B. Kagan, pp. 227-9. Philadelphia: W. B. Saunders Co. 1964.
- TASKER, R. R. "Preliminary Report on Stereotactic Surgery" (*Bulletin of the Academy of Medicine*, vol. 37, no. 3, Dec., 1963, pp. 44-8).
- TRIMBLE, A. S., BIGELOW, W. G., WIGLE, E. D. and CHRYSOHOV, A. "Simple and Effective Surgical Approach to Muscular Subaortic Stenosis" (*Circulation*, vol. 19, Supplementary Issue, 1964, p. 125).
- TRIMBLE, A. S., HEIMBECKER, R. O. and BIGELOW, W. G. "The Implantable Cardiac Pacemaker" (*Canadian Medical Association Journal*, vol. 90, no. 3, Jan. 18, 1964, pp. 106-10).
- TRUSLER, G. A., BULL, R. C., HOEKSEMA, T. and MUSTARD, W. T. "The Effect on Cardiac Output of a Reduction in Atrial Volume" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 46, no. 1, July, 1963, pp. 109-16).
- WELSH, W. K. and MACDONALD, J. A. "Pancreatic Abscess: A Report of Two Cases" (*Canadian Journal of Surgery*, vol. 6, no. 1, Jan., 1963, pp. 23-8).

THERAPEUTICS

Under the direction of Professor R. W. Gunton

The teaching programme in the third medical year consisted of weekly lectures and weekly theatre clinics. Dr. W. T. W. Clarke gave the instruction in diabetes. He and other members of the Department of Medicine gave valuable service by taking a number of the theatre clinic sessions. These patient-based discussions seem to offer the best type of instruction. Each student had prepared and submitted an assignment on the patient prior to the presentation by the clinician.

In the fourth year, the clinical-pharmacological conferences were more successful than in the preceding academic session. These were patient-based, but designed to expand into discussion groups of commonly used therapeutic agents. The contribution of members of the Departments of Medicine and Pharmacology was extremely important and valuable.

The following papers were presented: "Treatment of Heart Failure," St. Joseph's Hospital, Toronto, Clinic Day; "Investigation, Research, and Treatment of Heart Disease," Medical Section, Canadian Pharmaceutical Manufacturers Association; "Cardiovascular Investigation and Treatment in Toronto—a Review," Canadian Life Insurance Medical Officers Association; "Voice, Hand, and Eye in the Diagnosis of Heart Disease," Nova Scotia Cardiovascular Society; "Clinical and Laboratory Aspects of Bacterial Endocarditis," Advanced Study Course, Canadian

Society of Laboratory Technologists; "Hazards of Antibiotic Therapy," Annual Meeting, Ontario Medical Association.

RESEARCH

Dr. John Spears conducted a clinical trial of a new anti-hypertensive drug, guanoxan (Compound 1003, Pfizer). This agent is pharmacologically related to guanethidine and its mechanism of action is similar—depletion of sympathetic nerve endings of nor-epinephrine. The trial was carried out in association with Dr. J. D. Morrow of the Department of Medicine. Patients with advanced benign or malignant hypertension were carefully investigated in hospital, brought under satisfactory control in a hospital environment, and then followed as out-patients. Compound 1003, alone, or in combination with a thiazide diuretic was effective in lowering blood pressure to satisfactory levels. The "side" effects—postural hypotension, diarrhoea, and bradycardia—were not severe enough to require discontinuance of treatment. It is expected that Dr. Spears will continue this clinical evaluation next year.

Dr. Luigi Casella has continued the studies in progress over the past two years on photoscanning the heart following intravenous injection of radio-iodinated fatty acid albumin (RIFA). This project has been conducted in cooperation with Dr. John Evans of the Department of Medicine. The definition obtained from *in vivo* scans in humans was inadequate to provide diagnostic evidence of myocardial infarction, although the method looked promising. The development of a gamma camera by Dr. Baker's group in the Department of Biophysics appeared to offer the possibility of improved definition and of dynamic studies of rate of myocardial uptake of RIFA. Technical problems in the camera prevented realization of these objectives although several pilot studies were conducted in dogs injected with RIFA. Dr. Casella then adapted the principle to radio-autography of hearts of dogs in whom experimental myocardial infarction had been produced by coronary artery ligation. He analysed radio-autographs of sequential slices of left ventricle, taken from apex to base, and was able to quantitate the proportion of infarcted muscle by measuring the area of each slice which had taken up the radioactive fat and comparing it with the area of ischaemic tissue which had not.

PUBLICATIONS

GUNTON, R. W. "Drugs for Arrhythmias" (*Canadian Medical Association Journal*, vol. 90, no. 24, June 13, 1964, p. 1361).

THE DIRECTOR OF THE BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Professor C. C. Lucas and Dr. J. H. Ridout have continued their studies of the effects of different kinds and amounts of dietary protein on the incidence of intoxication and of hepatic lesions in rats given alcohol. Rats given 15 per cent v/v ethanol in place of drinking water did not become intoxicated even when alcohol provided as much as 20 per cent of the total calorie intake. Fatty livers and cirrhosis developed in those rats which were fed diets poor in protein, and many died, but those fed better quality proteins (such as skim milk powder and egg proteins) remained healthy and displayed much less damage to the liver. Other rats fed the same diets were given repeatedly 30 per cent v/v ethanol by stomach tube. Doses that caused profound intoxication in rats fed diets poor in protein produced much less effect in rats that were better nourished (with good protein). Rats fed the protein-poor diets displayed a decreasing tolerance for alcohol given by stomach tube: a dose that caused initially no ill effect produced severe intoxication after 100 intubations.

Dr. S. Mookerjea has continued studies of triglyceride metabolism in choline deficiency using the isolated, perfused liver technique. The ability of choline-deficient livers to add triglyceride to the perfusate can be partially restored when the livers are perfused with blood from choline-supplemented rats. The addition of choline and several choline derivatives to the perfusion system *in vitro* does not produce a similar effect. A search for the factor or factors present in normal rat blood which induces transport of triglycerides from fatty livers is continuing.

Professor W. Thompson and Dr. S. Mookerjea have made an analysis of phospholipids from normal and choline-deficient rat livers. They have noted differences in the hepatic phospholipid pattern, there being proportionately less lecithin and more phosphatidylethanolamine in choline-deficient livers. Preliminary evidence suggests that the rate of labelling of lecithin from inorganic P^{32} in livers of choline-deficient animals is significantly increased. The possible relationship between these alterations in phospholipid metabolism and excessive deposition of fat in choline deficiency is under investigation.

Dr. B. Rosenfeld has completed a study of the time course of hepatic lipid changes in the rat following the intake of both complete and choline-deficient diets. The cytoplasmic "fat globules" isolated from choline-deficient livers by centrifugation of liver homogenates have been found to have a greatly reduced phospholipid : neutral fat ratio, a factor which may have some bearing on the failure of choline-deficient livers to metabolize fat.

Dr. N. Morley continued to test, in several species of animals including man, the efficacy of an immuno assay which allows the measurement of the small amounts of biologically active insulin in plasma. This test has proved satisfactory for levels of insulin between 0.01 and 25 milliunits per millilitre in plasma from different sites in dogs under various experimental conditions. It is being extended to measure insulin from acid alcohol extracts of plasma.

Mr. C. R. Cowan has been working on the development of an extracorporeal chamber making possible the study of extremely thin films of blood with particular reference to platelets, platelet clumping and thrombosis. The recording of these processes on moving film has been successfully performed.

In Professor D. W. Clarke's section, studies on the effects of insulin and of DBI on the amounts of extractable ATP in the rat diaphragm have been continued by Mr. C. C. Liew as part of his requirements for the M.A. degree.

Studies of the effects of alcohol upon the extractable ATP from various parts of the rat brain have also been continued, and studies have been initiated on the effects of alcohol upon the different ATP-ases, extracted from various portions of the brain.

Miss L. Geiger, in partial fulfilment of the requirements of the B.Sc. (Medicine) degree, has completed one portion of her study on the effects of serum from animals suffering from experimental allergic encephalomyelitis upon the metabolism of isolated cerebral slices, and a second phase of the study is under way.

Work in Professor G. A. Wrenshall's section continues on the mode of action of factors which produce changes in the rates of production and utilization of glucose in dogs, using successive measured injections of C^{14} -glucose as tracer. Aspects of these studies include: the rapidity of the effects of clamping off and restoring the blood supply to a pancreatic remnant (with Professor A. M. Rappaport and Dr. M. Vranic); progressive changes in the rate of glucose production during fasting after diets high in either carbohydrate, protein, or fat (with Mr. J. Cowan); rates of glucose influx and utilization in a specified muscular region *in situ* (with Mr. S. Ilk); the operation of a homeostatic mechanism for the amount and the concentration of glucose before and after sudden changes in the rate of glucose infusion, as well as further studies on the validity of the tracer methods being used (with Professor G. Hetenyi, Jr.).

With the assistance of Miss M. M. Shaw and Mr. J. Skublics, Professor W. R. Franks has continued the work in cancer research. Experiments to modify the tumour-bearing host into a graft-hybrid in which the tumour thereby becomes somewhat foreign to the resulting chimera and thus more vulnerable to other forms of

treatment have been continued. Successful methods of protecting the resultant graft-hybrid from auto-destructive immunologic processes remain to be worked out. An occasional stasis of mammary carcinoma growth with host survival has been attained by grafting with bone marrow, lymphoid and intestinal mucosal cells derived from the host's parent after immunization of the latter against the host's tumour, but the vast majority of the tumour-cured animals fail to survive.

Studies of the possible survival of tumour-inducing viral agents in various plant tissues have been initiated. Results with a mouse leucosis in certain fruits warrant further investigation. The cancer work is seriously hampered by inadequate support.

In the accident-investigation studies it has been found that an adrenergic response previous to a fatal termination can be identified by a marked increase in precursors in kidney, which break down to lactic acid post mortem.

With Mr. G. A. Meek studies on the ballistics of arm movement have been initiated with a view to improving dexterity in the presence of vibration.

In Professor J. M. Salter's section investigations of mechanisms controlling urea synthesis and amino acid metabolism have continued. Miss S. Ruedy has found that glucagon accelerates the catabolism of glycine to a greater extent than other amino acids and that the subsequent shortage of glycine is primarily responsible for the inhibitory effect of the hormone on creatine synthesis.

Earlier studies revealed that pyruvate inhibits urea synthesis *in vitro* by transaminating ornithine and thus destroying it. Convincing evidence has been obtained that as a result of the ornithine-pyruvate transamination reaction, pyruvic acid concentrations in the liver are of primary importance in the control of gluconeogenesis and amino acid catabolism in normal intact animals. These findings also appear to explain some metabolic alterations known to occur in tumour-bearing animals. It is established that malignant tissue produces excess lactic acid. Its conversion to pyruvate in liver tissues inhibits urea synthesis. The consequent improvement in the supply of amino acids enhances tumour growth and also facilitates the hypertrophy of the liver which occurs in tumour-bearing animals. Additional studies indicate that the consumption of plasma albumin by the Walker carcinosarcoma is responsible for the hypoalbuminemia present in the afflicted animals. Other observations suggest that the albumin is first bound to the surface of the neoplastic cell and hydrolysed to free amino acids which are then utilized for intracellular anabolism.

Several investigators have observed that conditions which accelerate the deamidation of glutamine also impair urea formation. This has led some to believe that under normal conditions urea is formed directly from glutamine and not by the Krebs ornithine cycle. Mr. R. Cook has shown that the factors which increase deamidation of glutamine also impair activity of the ornithine-urea cycle. No evidence could be obtained that urea can be formed directly from the intact glutamine molecule.

In Professor J. Logothetopoulos' section, studies on the factors controlling insulin release and synthesis have been continued. In collaboration with Dr. E. Bell, a comparative study of insulin antibodies in various species has been made. The diabetogenic effect of pregnancy in the guinea-pig is being investigated with Dr. J. Killingbeck. Electron microscopical studies on stimulated and inhibited cells of the pancreatic islets have been carried out with Miss P. McKeag.

In Professor D. G. Baker's section, with the assistance of Mrs. D. Coles and Miss S. Christie, the investigation of radiation injury and recovery processes in a variety of test systems has been continued. Recent investigations have been concerned with the response of the gastrointestinal tract. The collaborative study of plasma proteins with Dr. A. Carsten of the Brookhaven National Laboratories has been continued. Mr. F. Valeriote has completed his study of the effect of thermal burns and X-irradiation in partial fulfiment for the degree Master of Arts. Mr. A. Nakeff has initiated a study on radiation injury and recovery of the hematopoietic system. In collaboration with Dr. G. M. Clark, Department of Zoology, a study of the radio-sensitivity of commercially valuable trees in southern Ontario has been initiated.

Dr. W. J. Linghorne is continuing his studies in osteogenesis particularly as it operates in the repair of fractures.

Mr. K. R. Bowler, as Comptroller of the Institute, has continued to give invaluable assistance to the members of the staff, and to the Department of Physiology, in the administration of services within the Institute.

In the Sub-Department of Synthetic Chemistry, the synthesis of phospholipids of biological interest was continued by Professor E. Baer and his colleagues, Professor D. Buchnea (propylene glycol analogues of cephalin and lecithins), Dr. V. G. Rao (L- α -glycerylphosphoryl-2-amino-2-methylpropanol), Dr. J. Rao (amino acid esters of L- α -phosphatidyl-glycerols), Dr. J. Blackwell (highly unsaturated L- α -cephalins), Dr. P. Cooper (phosphate esters of α -, β - and γ -homocholines), Dr. N. Z. Stanacev (ether- and ester-analogues of phospholipids with structural resemblance to cephalins and lecithins). The members of the staff were ably assisted by Mr. H. Flehmig.

Professor B. S. Leibel's extensive clinical knowledge of diabetes has been of great help to the department in his co-operation with several of the groups who are studying related problems in animals. Dr. Leibel is joint chairman of the Committee on Scientific Program and Publication for the Fifth Congress, International Diabetes Federation, July 20-24, 1964.

C. H. BEST

PUBLICATIONS

- ABBOTT, M. M., HIMEL, H. A., LEIBEL, B. S., MARKSON, C. A., STARKMAN, S. P. and STEIN, H. A. "Diabetes Mellitus and its Complications in an Elderly Population" (*Canadian Medical Association Journal*, vol. 90, no. 12, Mar. 21, 1964, pp. 726-30).
- BAER, E. "The Synthesis of Phospholipids"; in *Progress in the Chemistry of Fats and Other Lipids*, vol. 6, by R. T. Holman, W. O. Lundberg, and T. Malkin, pp. 33-86. Oxford: Pergamon Press. 1963.
- BAER, E. and RAO, G. V. "Phosphatidyl-2-amino-2-methyl-propanols" (*Journal of Biological Chemistry*, vol. 238, no. 6, 1963, pp. 1941-6).
- BAER, E. and BLACKWELL, J. "Phosphatidyl-1-2-amino-1-propanols: I, Synthesis of Dimyristoyl- and Distearoyl-1-alpha-glycerylphosphoryl-1-2-amino-1-propanol" (*Journal of Biological Chemistry*, vol. 238, no. 11, 1963, pp. 3591-4).
- BAER, E., YASUYUKI, S. and BLACKWELL, J. "The Synthesis of Alpha Cephalins by a New Procedure" (*Biochemistry*, vol. 2, 1963, pp. 1227-32).
- BAKER, D. G. "Acute Radiation Injury in the Alimentary Tract: A Review" (*Revue Canadienne de Biologie*, vol. 22, no. 1, 1963, pp. 91-7).
- BAKER, D. G. and MONKHOUSE, F. C. "Clearing Factor Lipase and the Irradiation Syndrome" (*Radiation Research*, vol. 20, no. 1, Sept., 1963, pp. 8-16).
- BAKER, D. G., CARSTEN, A. L. and SAFFORD, C. "A Method of Characterizing Protein Changes in Serum after X-Irradiation" (*Radiation Research*, vol. 20, no. 3, Nov., 1963, pp. 431-42).
- BASRUR, V. R. and BAKER, D. G. "Human Chromosome Breakage in Low Calcium Cultures" (Letter to editor) (*Lancet*, vol. 1, no. 7290, 1963, pp. 1106-7).
- BEST, C. H. "The Man from W. H. O." (*The United Nations in Action*, vol. 1, no. 4, Mar.-Apr., 1964, pp. 13-15).
- *Selected Papers of Charles H. Best*. Toronto: University of Toronto Press. 1963. Pp. 723.
- CAHOON, SISTER M. O'DILE, CLARKE, G. M. and BAKER, D. G. "Lag Phase of Escherichia Coli as Influenced by X-Rays Temperature and Nutrient" (*Canadian Journal of Genetics and Cytology*, vol. 5, no. 4, Dec., 1963, pp. 472-81).
- CLARKE, D. W. "Mode of Action of Some Hypoglycemia Agents" (*Applied Therapeutics*, vol. 5, no. 7, 1963, pp. 612-13).
- CLARKE, D. W. and GEIGER, L. "Effect of Experimental Allergic Encephalomyelitis Serum on Fatty Acid Output of Brain Slices" (*Nature*, vol. 201, no. 4917, 1964, p. 401).
- FRANKS, W. R., MCGREGOR, A., SHAW, M. M. and SKUBLICS, J. "Radiation Chimeras Grafted with Immune Lymphoid and Intestinal Mucosal Cells" (*Proceedings of the American Association of Cancer Research*, vol. 4, no. 76, 1963, p. 20).
- KANEKO, M. and LOGOTHETOPOULOS, J. "Sensitivity of Beta Cells to Alloxan after Inhibition by Insulin or Stimulation by Glucose" (*Diabetes*, vol. 12, no. 5, Sept.-Oct., 1963, pp. 433-6).
- KRAICER, J. and LOGOTHETOPOULOS, J. "Adrenal Cortical Response to Insulin-Induced Hypoglycaemia in the Rat: I, Adaptation to Repeated Daily Injections of Protamine Zinc Insulin; II, Mediating Role of Adrenaline and/or Noradrenaline; III, Lack of Adaptation

- to Repeated Daily Injections of a Short Acting Insulin Preparation" (*Acta Endocrinologica*, vol. 44, 1963, pp. 259-71, 272-81, 282-90).
- LOGOTHETOPOULOS, J. "Growth and Function of the Thyroid Gland in Rats Injected with L-thyroxine from Birth to Maturity" (*Endocrinology*, vol. 73, no. 3, Sept., 1963, pp. 349-52).
- LOGOTHETOPOULOS, J., KANEKO, M., WRENSHALL, G. A. and BEST, C. H. "Zinc, Granulation and Extractable Insulin of Islet Cells Following Hyperglycemia or Prolonged Treatment with Insulin"; in *The Structure and Metabolism of the Pancreatic Islets*, Third Wenner-Gren Symposium, pp. 333-47. Oxford: Pergamon Press. 1964.
- MOOKERJEA, S. S. "Metabolism of Lipid by Isolated Perfused Liver in Choline Deficiency" (*6th International Congress of Biochemistry*, New York, July 26-Aug. 1, 1964; Lipids and Steroids, section VII, abstract no. 105, 1964, p. 587).
- ROSENFELD, B. and LANG, J. M. "Liver and Plasma Lipid Changes in the Rat Following the Intake of Complete and Choline Deficient Diets" (*6th International Congress of Biochemistry*, New York, July 26-Aug. 1, 1964; Lipids and Steroids, section VII, abstract no. 128, 1964, p. 592).
- SALTER, J. M. "Protein metabolism"; in *Diseases of Metabolism*, by Garfield Duncan, pp. 1-104. London: W. B. Saunders Co. 5th ed., 1964.
- STANACEV, N. Z., BAER, E. and KATES, M. "Diether Analogues of Lecithins: Synthesis of Di-O-octadecyl L-alpha Glycerylphosphorylcholine" (*Journal of Biological Chemistry*, vol. 239, no. 2, 1964, pp. 410-13).
- WRENSHALL, G. A. and HETENYI, G., JR. "Tests of the Validity of Tracer-Calculated Amounts and Transfer Rates of Substances in the Blood Plasma of Living Animal Systems" (*Annals of the New York Academy of Sciences*, vol. 108, article 1, May, 1963, pp. 259-72).

